WIRE & WIRE PRODUCTS

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

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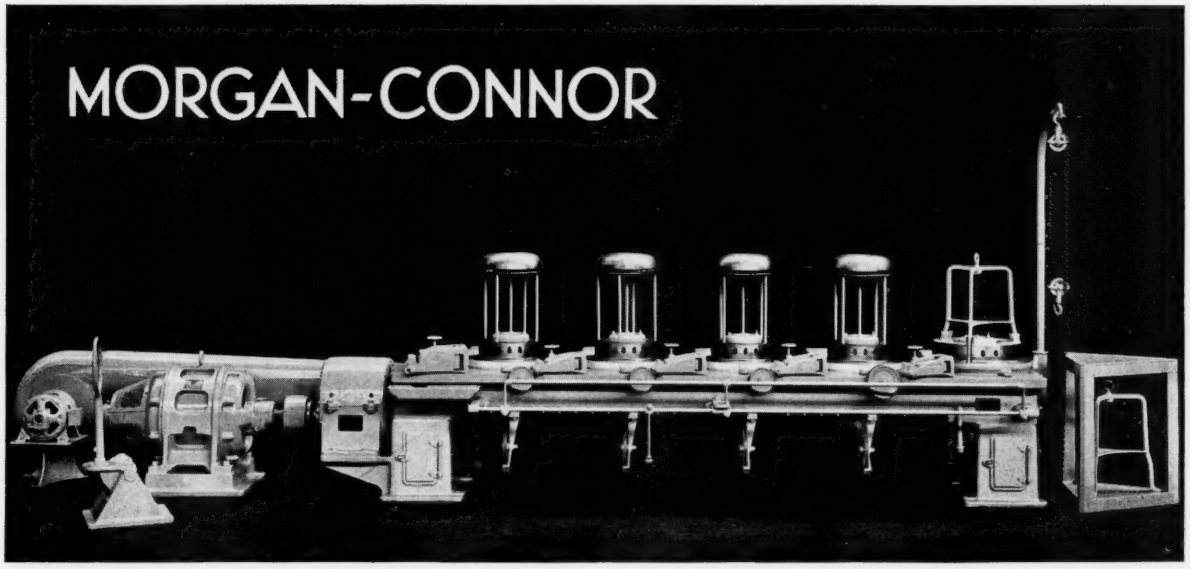
WORCESTER



SAFETY

The prime requisite of a safety stop is that it shall always be in working order.

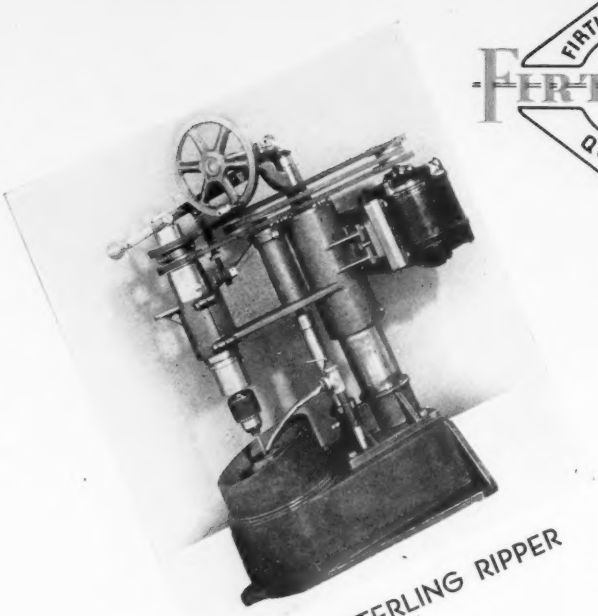
The safety stop of the Morgan-Connor Wire Machine, which is a guard rail running the length of the machine, is the only means of starting and stopping.

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS
MALMEDIE & COMPANY, Dusseldorf, Germany
Sole Licensee for Morgan-Connor Wire Machines in Europe

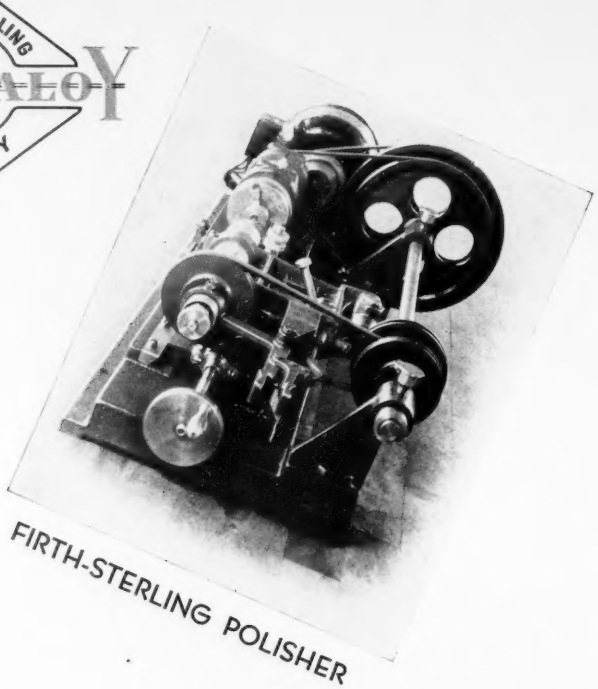
ROLLING MILLS GAS PRODUCERS WIRE MACHINERY
COMBUSTION CONTROLS

December 1932

FIRTH-STERLING
FIRTHALOY
QUALITY



FIRTH-STERLING RIPPER



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HARTFORD CLEVELAND
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PHILADELPHIA
GLOBE WIRE DIVISION
SHARPSBURG, PA.

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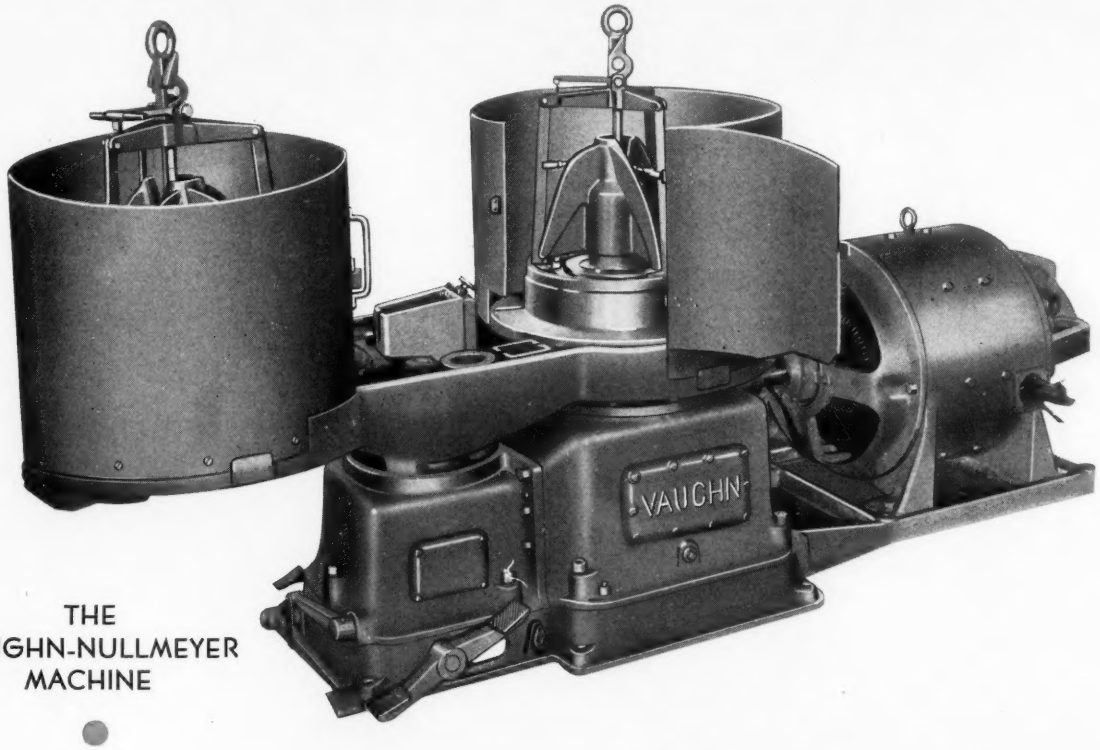
for drawing STEEL WIRE



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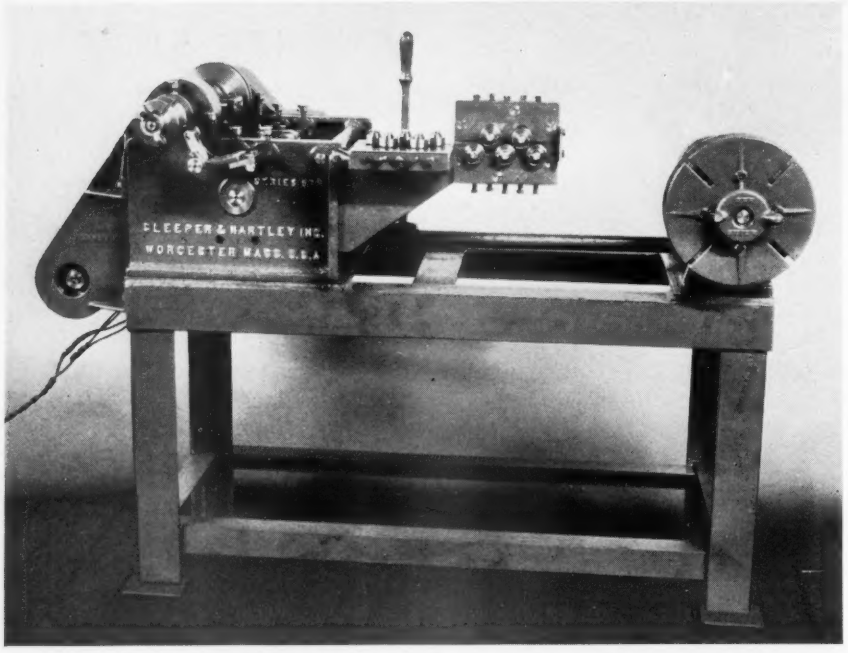

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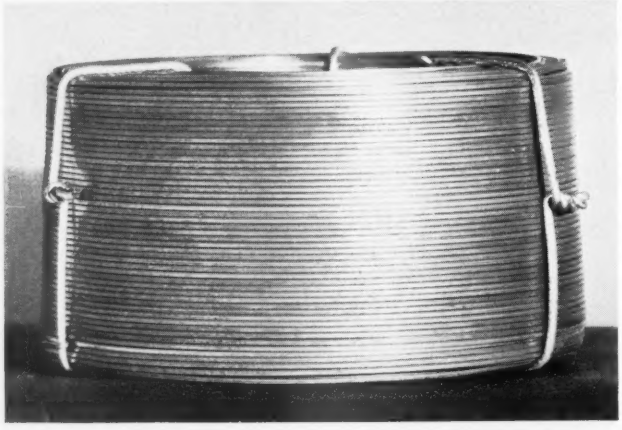

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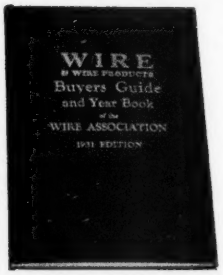

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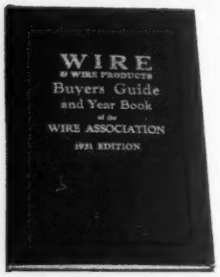

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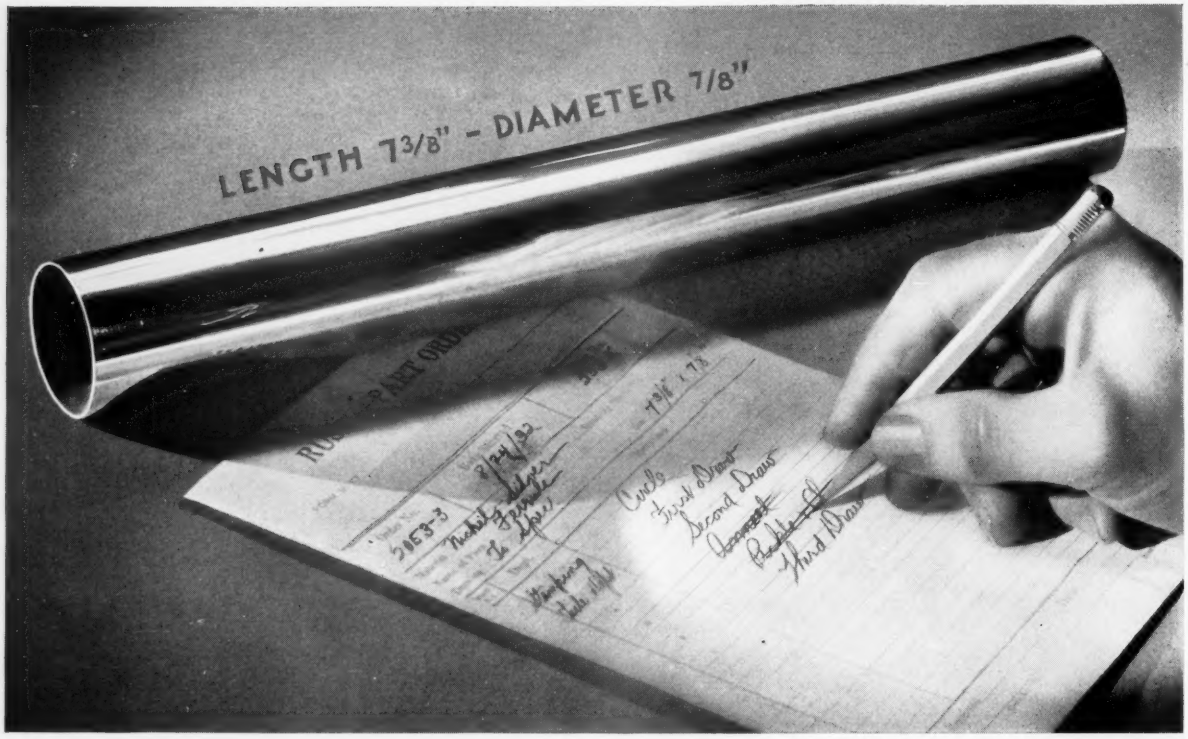

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DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING.

Vol. 7 December 1932 No. 12

Designated as

Official Publication By The Wire Association

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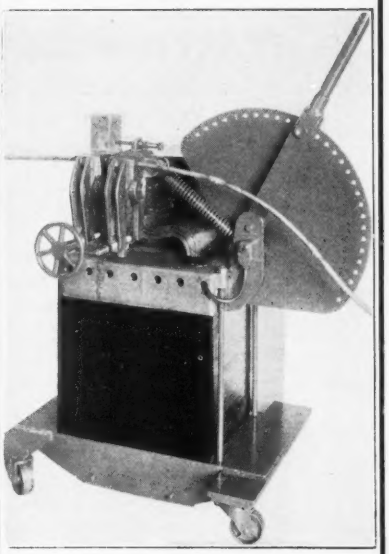

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A monthly publication devoted to the production of Wire, Rod and Strip.
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DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 7 DECEMBER, 1932 No. 12

Wire Covering Braiders

By Sidney B. Blaisdell
Fidelity Machine Company, Philadelphia, Pa.

A description of the development of wire covering braiders and an outline of up-to-date methods for braiding. ▼ ▼ ▼

THE machines referred to by this title are nearly as many and as varied as the wires which they cover. The different weights, sizes and materials composing the insulation as well as the varying diameters of the wires require braiders having distinct characteristics which enable them to produce the desired materials.

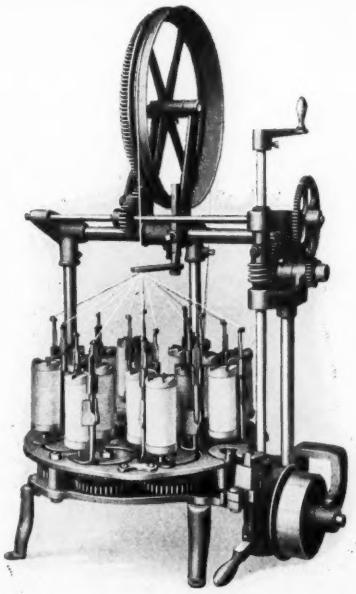
✦ ✦ ✦

THE development of braiding machines in this country seems to have started prior to much activity in the insulated wire fields.

✦ ✦ ✦

THE earliest American patent which the writer has found referring to a braiding machine, was granted in 1821 to Mr. J. Thorp of Providence. During the period from 1821 to 1872, twenty-nine patents were granted on braiding machines as well as a number of patents relating to carriers and yarn tension devices. Likewise, in the period from 1850 to 1872 a large number of patents were granted covering Electro-Magnetic Engines, Batteries and similar devices. In 1865 a patent was granted for a braiding machine to cover wire thus linking the two industries.

THE earlier machines were of the Maypole type and were modified forms of the braiders used for producing textile braids. The construction of these machines was somewhat crude but the principles involved were carefully worked out and the economic value of the machine firmly established. Named for the Maypole dance by virtue of their resemblance to this sprightly affair, the machines consisted of two sets of bobbins holding carriers sliding in opposite directions along two intersecting serpentine pathways in the braider. The number of the carriers and their locations determining the size and type of braid produced. It is rather important to note that as a characteristic of this type of machine both sets of carriers travel in similar paths and move equal distances to clear each other.



MAYPOLE TYPE
Single Deck Wire Covering Braider. (Courtesy New England Butt Co.) ✦ ✦ ✦ ✦

✦ ✦ ✦

THE mechanical construction commonly employed consisted of a top and bottom plate bolted together in spaced relationship and having a set of four-horned gears mounted between them. The horns of the gears engaging with driving lugs on the base of the carrier, there being twice as many horns as carriers, to move them about the machine. Each braiding ma-

chine was equipped with an individual driving pulley, stop motion and take-off device and thus became a self-contained unit capable of continuous independent operation.

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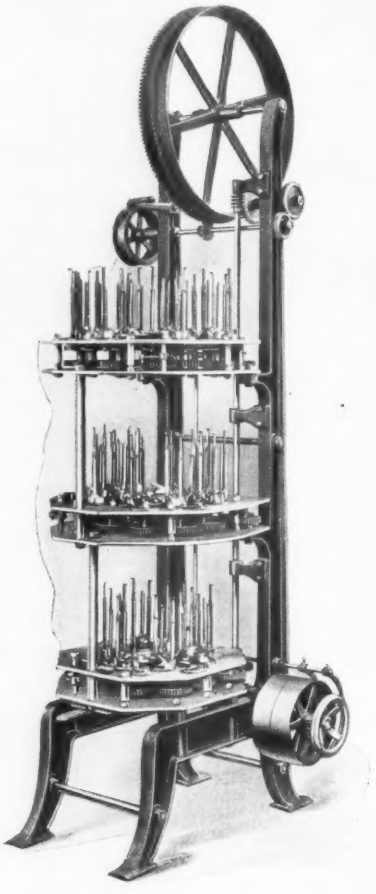
SHORTLY after the adoption of the braiding machine for producing insulated wires, it was found advisable to put more than one braid on the wire and double and triple deck machines were built for this purpose. These braiders were made like the single deck machines and had a single driving pulley and a common stop motion and take-off device for all decks.

✦ ✦ ✦

THE increasing demands for wire called for quicker methods of manufacture and larger productions from the braiding machines. To meet this demand the operating speeds of the braiders were increased and types of carriers developed which could operate at higher speed. As early as 1866 the Patent Office records an improved braiding machine carrier the fore-runner of a long line of patents showing the thought and effort which has been expended in perfecting this feature of the machine. The earlier machines were equipped with carriers having tension and top weights. At higher speeds the top weights flew off and were unsatisfactory, hence the bottom latch carrier using the bobbin upside was introduced. This carrier retained the tension weight and released the yarn by some type of bottom latch actuated by the weight. Other developments of the bottom latch carrier using springs instead of tension weights have still further increased the operating speeds until the modern braiders equipped with yarn packages, operated at speeds as high as 500 picks, or stitches, per minute compared with the 288 picks, or stitches, per minute obtained from the machines having the original carriers. Along with this development of carriers has come an improvement in the construction of the machines, better materials being used, more accurate machine work being employed and changes in design being made to enable the machines to run continuously at the higher speeds.

✦ ✦ ✦

MODIFICATIONS of the original design have been made grouping a number of braiding units on a steel frame work and supplying them with a positive gear drive from the built in line shaft, thus assuring them of a constant maximum operating speed and making use of the most modern methods of transmitting power.



MAYPOLE TYPE
Triple Deck Wire Covering Braider. (Courtesy Textile Machine Works). ✦ ✦ ✦ ✦

✦ ✦ ✦

THE Maypole type braiders referred to above were all constructed using the regular top plate and horn gear construction and having the carriers supported by the top plate. During the World War a modified form of machine made its appearance. In this braider the carriers were supplied with bases resting on the horn gears and the top plates were made extremely thick to hold the carriers upright. The idea being to increase the speed and to reduce the power consumption. A further development along these lines has eliminated the top plate and placed the horn gears in deep well-like recesses. The upper part of the horn gear being a cylinder and the carrier being supported between the side of the well and the cylinder. Switches were used to transfer the carrier from one horn gear to another and so carry it around the machine. A number of these machines were built and their speeds proved to be considerably in excess of the speeds of the standard Maypole braiders. A still further development along these lines uses a modified form of horn gear supporting the base of the carrier in recesses near the top of the gear. The upper part of the horn gear projects over a stationary plate on which are mounted cams controlling latches that lock the carrier to the horn gear. The action of these latches transfers the carrier from one modified horn gear to another and so directs it in a serpentine path about the braider.

✦ ✦ ✦

MACHINES of this construction have been made in various sizes and have proven capable of continuous operation at speeds as high as 600 picks, or stitches, per minute using yarn packages 3 inches in diameter and 6 inches in traverse.

✦ ✦ ✦

THE versatility of the Maypole type has enabled it to be used for handling the more difficult materials and carriers have been developed so that the machines can braid asbestos, wire and strip material. Other constructions have been made with the machines having the axis horizontal allowing the braids to be applied to inflexible material. Still other machines have been built for covering of cables and heavy material.

✦ ✦ ✦

WHILE the changes noted were being made in the Maypole type of braiders to increase their production, another group of in-

ventors were working to produce a much higher speed machine for making the same products. Disregarding the construction and principles on which the Maypole type of braider was constructed, they set out with the aim of producing a rotary machine in which both sets of bobbins or yarn packages would rotate about a common center and the threads from one set of packages would pass over and under the other set of packages to form the braid.

✦ ✦ ✦

AS a result of years of experiment several types of so-called high speed braiders were developed and put on the market. The most successful of these machines was built under an original patent dated 1907. The difference in the dates of the patents covering the Maypole type of braider and the high speed type gives a good idea of the difficulties to be overcome in developing an economical high speed braider capable of continuous independent operation.

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THE machine referred to above consists of a rotating member supporting half the yarn packages and a sectional track upon which the other half of the yarn packages rotate in the opposite direction. The latter or upper yarn packages are driven by spaced lugs projecting from an oppositely rotating member. The lugs being arranged in pairs and being cam operated to permit the passage of the thread from the first or lower yarn packages under the upper yarn packages. Thread guides operate in connection with the driving lugs to direct the lower threads in the proper sine path to form the desired braid.

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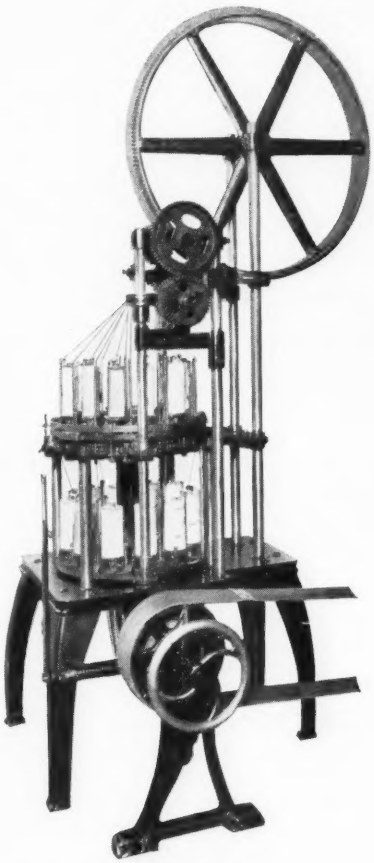
MACHINES of this construction have operated very successfully at speeds of 1280 picks, or stitches, per minute.

✦ ✦ ✦

ANOTHER type of high speed machine attaches the lower yarn packages to a rotating member while the upper yarn packages are individually mounted on shuttles sliding on the same member and driven in the opposite direction by bevel gears engaging with teeth cut on the lower side of the shuttle. The bevel gears are journaled on a stationary member and are revolved through a rack attached to the lower member. The threads from the lower yarn supplies pass through the center of



INTERMEDIATE TYPE

Wire Covering Braider. (Courtesy Fidelity Machine Co.)

✦ ✦ ✦ ✦ ✦ ✦

rolling gears mounted on the lower members and meshing with a stationary rack, and then through guide arms mounted on the gears. As the gears roll the arms pass the thread over and under the upper yarn packages in the proper relationship to form the braid. Since all the parts of this machine are continuously rotating it is capable of extremely high speed and runs efficiently at speeds of 1600 picks, or stitches, per minute.

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A STILL further development of the high speed principle consists of a rotating member carrying the lower yarn packages and horizontal grooves in which are mounted rollers carrying the inner yarn packages. A second member rotating in the opposite direction is provided with positively driven wheels which contact with wheels on the inner yarn packages and serve to push them about the machine in timed relationship. The yarns from the lower packages pass through guides rotating in a sine curve and pass over and under the inner yarn packages. In passing under the inner yarn packages the yarn goes through the rollers mentioned above. These rollers are surfaced with a special substance and roll the threads through without injury. Various modifications of this design have been run successfully at high speeds.

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IN recent years a third type of braiding machine has made its appearance. This braider is really a combination of the two types previously described and works on the principle that one set of yarn packages shall rotate about the common center and the other set of yarn packages shall move in a modified sine path about the common center while the yarns from the first shall move in an equal and opposite sine path about the second set.

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IN one form of this machine the lower yarn packages are mounted on a rotating member while the upper yarn packages are mounted on carriers driven by horn gears in a usual raceway. In the opposite raceway are mounted special carriers which are merely yarn guides for directing the yarns from the lower yarn packages about the upper packages. The rotating member supporting the lower yarn packages necessarily rotates at the same speed that the horn gears drive the thread guides about the machine. The horn gears are of a peculiar construction permitting the lower threads to pass through them and the usual bottom plate is made in two sections supported in the center and outer edge to permit the passage of these

(*Please turn to page 441*)

The Manufacture of Bolts and Nuts

By J. B. Nealy

American Gas Association, New York, N. Y.

The Lake Erie Bolt & Nut Company, a Subsidiary of the Lamson & Sessions Company, Cleveland, Ohio, Effects Material Process Improvements Through the Use of Gas As a Fuel. A Description of the Processes Employed In the Production of Bolts and Nuts.

SPEAKING in terms of mechanics, bolts, nuts and rivets hold the world together. As demands upon these simple items grow constantly heavier, progressive improvements are made in their construction and manufacture. Starting with puddled iron, which was a superior metal in its day, the transition to steel was not long delayed after this metal was perfected, while today, alloy steels are gaining universal attention and widespread adoption in the bolt and nut industry. In addition various heat treatments, to bring out the best physical characteristics, have become general in use. More recently still the technique of the hot forging process has been so improved as to obtain complete control over the grain flow and provide the maximum amount of working.

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ONE concern that has passed through these and other progressive changes, and pioneered in many of them, is the Lake Erie Bolt & Nut Company, Cleveland, Ohio, which was started in 1852 as the Lake Erie Iron Company and is now a subsidiary to the Lamson & Sessions Company. This concern produces a complete line of bolts and nuts and in addition makes upset forgings for the automobile trade and the railroad industry. This unit covers more than eight acres of ground and is served with spur tracks from both the New York Central and Pennsylvania Railroads.

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SIZES below ¾ inch in diameter and up to six inches long can be produced by the cold heading method although most bolts half inch and above are formed hot. Hot heading is divided here into, first, continuous rod heading and second, tong heading, anything over seven inches in length falling in the latter class, and these two divisions are housed in the same building. Overhead gantry cranes operate the entire length of the building and spur railroad tracks enter it for ease in unloading incoming raw materials and loading outgoing shipments of finished products. The hot nut pressing division is housed in another building while a third contains the miscellaneous upset forging division.

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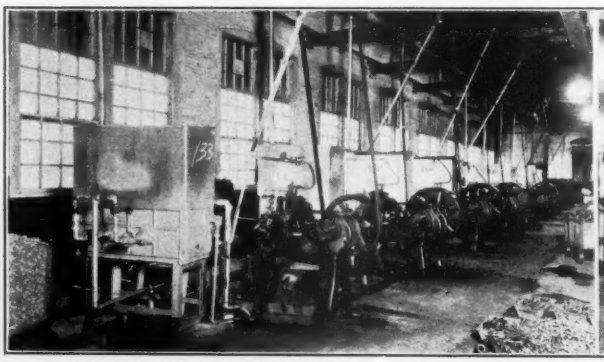
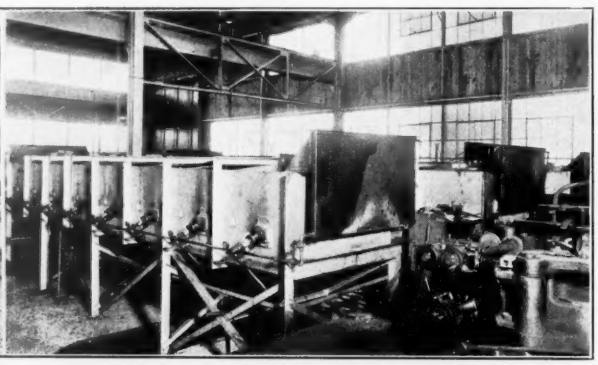
Continuous Rod Heating

THE continuous rod heading method is automatic and continuous except for the feeding of the rods into the furnace and then placing the ends of the hot rods into the upsetter gripper. When the end of the hot rod is "caught" the upsetter forms the head, cuts to length, ejects the bolt into a quench and slips its grip on the rod back far enough for the next bolt. This it continues to do until the rod is used up when the operator pushes another hot rod into place. The rods are about 24 ft. long and bolts ranging from ⅜ to 1⅛ in. in diameter are produced in these upsetters or headers at a rate of from 100 to 140 per minute according to the diameter.



One battery of furnaces and upsetters in the tong heading division.



A close up of the continuous rod heading furnace showing the location of the burners and the water cooled shield on the end. ✦ ✦

Upsetters

THERE are five upsetters and each is served with a gas fired furnace of brick construction, steel encased and setting on 3 ft. legs. Each furnace is 26 ft. long, 5 ft. wide and 4 ft. high. There are 8 gas burners on each side of the furnace or 16 in all. The burners fire tangentially against the arc of the roof and they are staggered so as not to fire against one another. In this way complete circulation of the hot products of combustion, from opposite directions, is obtained. High pressure gas is used and each furnace has an automatic temperature control, which includes a motor operated valve in the gas supply line by which the gas supply to the burners is increased or decreased automatically, as the furnace becomes too hot or too cold.

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THE upsetters are placed on platforms so that the "grippers" are on a level with the slots in the ends of the furnaces and the quench tanks are located below the platforms. The slots are the only openings to the furnaces and are of such a size to allow the rods to pass through easily. Several rods are charged into each furnace simultaneously and as soon as one is used up it is replaced by another according to a time schedule that will always insure hot metal for the machine. To protect the operators water cooled baffles or boxes are placed at each end of the furnace so that the heat coming out of the end slots passes up between them and the furnace.

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Quenches

FROM the upsetters the bolts are ejected into quenches and these consist of steel tanks 12 ft. long, 2 ft. wide and 20 in deep. Each tank is provided with an apron conveyor which receives the bolts as they drop through the quenching medium and carries them up and out of the quenches and finally drops them into boxes on trucks for further handling. This quench from the forging heat is a regular hardening treatment, used on standard bolts, and adds 10,000 lbs. to the tensile strength and the final tensile of regular material product is a minimum of 80,000 lbs. per sq. in.

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THESE quenches are kept cool by an automatic cooling system which includes the regulation type cooling tower. When the temperature rises above 160 deg. F. pumps are automatically started which force the quenching medium out of the tanks and over the tower. As soon as the temperature drops to 120 deg. F. the pumps are automatically stopped.

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Tong Heading

TONG heading derives its name from the fact that the stock is sheared to length and then handled with tongs by an operator from the buggy to the furnace and from the furnace to the upsetter and finally is thrown into boxes for transfer to the heat treating department. Bolts ranging from 3/16 to 2½ in. in diameter and of any length, are made in this division. Here also are located 20 upsetters and 20 gas fired slot type furnaces. These furnaces are hooded and range in size from 3 to 8 ft. long, 14 to 24 in. deep and 20 to 30 in. high and each rests on 3 ft. legs. They are heated with from 2 to 6 gas burners each and the burners are located in the lower backwall, so as to underfire the work.

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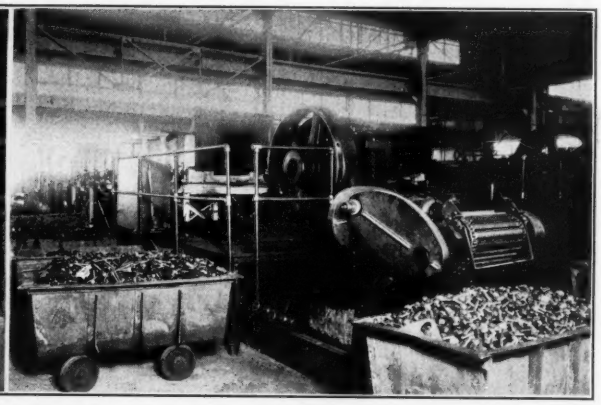
Safety Shields

TO protect the operator from the front slot of the furnace a metal water cooled shield is used. The metal shield is cooled with a continuous supply of water flowing from a perforated pipe in front of the hood. The metal shield has a trough at the bottom which catches the water. This is augmented with a forced air shield over the slot from a welded steel box which is located below and in front of the furnace slot. This box is as long as the slot, 2 in. thick and 6 in. wide. It is bolted to the furnace wall so as to form a 6 in. shelf in front of the slot for the work to rest on while the ends are being heated. There are three rows of holes in this box for the air to escape through after it is forced in through a pipe in one

Setup for heating and forging 3½" bolts. Notice minimum of opening in gas furnace for introduction of stock. ✦ ✦ ✦



Continuous rod heading unit showing furnace, up-setter, quench, conveyor and boxes of bolts. ✦ ✦ ✦ ✦ ✦

end. This forced air shield blows directly upward in front of the slot and forces the flame and heat up between the furnace and the water shield.

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Gas Fuel Used

HIGH pressure gas (25 to 30 lbs.) is used in velocity type venturi burners which inspirate air for combustion. These can be regulated so as to provide either a reducing, neutral or oxidizing mixture. For tong heading a slightly reducing atmosphere is employed so as to keep scaling to a minimum. Three of the furnaces, however, use the low pressure system of firing. There is a special bolt and nut forging setup for 3½ in. sizes.

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Labor Saving In Handling

AMONG the labor saving devices used is a buggy, which consists of a welded steel frame on wheels. The sheared stock is neatly piled on this buggy and the buggy can be wheeled in front of the furnace. The operator charges the furnace directly from this piled buggy with a minimum amount of motion and handling. This method replaces the old method by which the stock was thrown "hit or miss" on the floor and it shows an increase in efficiency of 15%.

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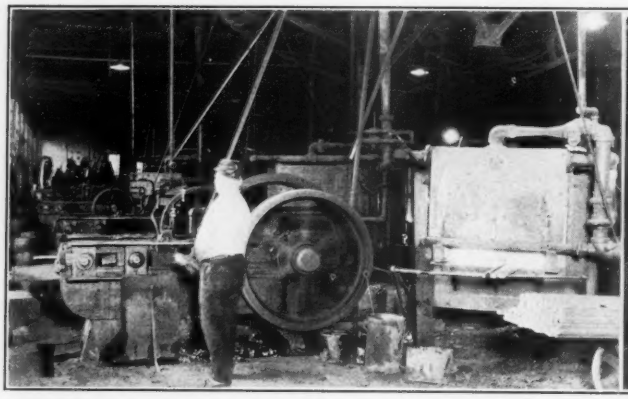
Hot Pressed Nut Division

THE hot pressed nut division consists of 10 units, each unit consisting of a furnace and a hot nut machine. Long flat steel bars approximately 10 ft. long are heated in the furnaces and then transferred to the machines which punch or pierce, crown, cut off and eject in a single stroke. When the hot portion is used the remainder of the bar is again heated and so on until it is used up. Strictly speaking the machine first shears the stock to length and forces the piece into a stationary die, the piercer then punches out the center followed by the crowner which shapes one face. A second forward movement of the crowner serves to eject the nut and slug. Then they fall onto a traveling conveyor which conveys them into containers.



View in hot pressed nut division showing closeup of gas fired forge furnace and nut machine.

Gas Forge Furnace and Machine Showing Special Buggy and Special Piling of Stock Which Reduces Handling Time.

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Screening Methods

THERE are two methods of screening the slugs and scrap from the nuts, the first utilizes a flat shaker screen. The material, composed of the nuts and slugs, is lifted and dumped onto the shaker screen by an elevator conveyor, everything but the nuts falling through. The nuts pass over the edge into containers and are removed to the burring department. In the second method the larger sized nuts are passed through a revolving steel cylinder, 4 ft. long and 2 ft. in diameter which has long slots through which the slugs fall. These slots can be adjusted to accommodate slugs from different sized nuts.

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The Forge Furnaces

THE forge furnaces in the hot pressed nut division are of the slot type. They are of brick, steel encased and each is heated with two gas burners, one in each end. Most of these are 4 ft. wide, 5 ft. deep, 2 ft. high and set on 3 ft. legs. A two inch perforated pipe, built into the lower lip of the slot is used to blow the escaping heat up and behind a hanging shield to protect the operator. One of these furnaces is double chambered. The largest machine, one forming 1½ in. nuts, is served with two furnaces.

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Tool Steel Hardening

THE Tool Steel Hardening Department contains five periodic gas furnaces of brick, steel encased, and about five feet in all three dimensions. Each is underfired with one gas burner located in front. These are used interchangably for various kinds of heat treatment, and are served with four steel quench tanks. Another furnace, fired with two gas burners on each side, is 10 ft. long, 6 ft. wide and 5 ft. high. Several smaller furnaces are also in use, while a hot plate, setting in a brick

(*Please turn to page 436*)

The Testing of Rope Wire and Wire Rope

By A. V. deForest, Consulting Engineer
American Cable Co., Bridgeport, Conn.
and
L. W. Hopkins, Materials Engineer
Page Steel and Wire Co., Bridgeport, Conn.

PART II

Wire Rope is probably subject to more abuse and less discrimination in the field than any other accurately designed and constructed mechanism. For this reason, accurate prediction of rope life on the basis of laboratory tests is often disappointing. Service records show, however, that the general level of rope performance is raised by the improvement of the component materials. This improvement can best be effected by the application of suitable test methods for the measurement of quality evolution.

This paper describes a few of the methods applied to wire and wire rope by the authors, and typical applications of the resultant test data.* ▼ ▼ ▼ ▼ ▼

THE properties of wire rope of most interest to the user are strength, flexibility, elasticity, resistance to wear or abrasion, rate of deterioration due to bending, and corrosion. The determination of breaking strength and elastic properties of rope is preceded by careful preparation of specimens. The gage length of specimen is usually equal to approximately 10 rope lays. The wires are unlayed or "bushed" at each end, cleaned with gasoline and acid, and inserted in a standard type of wire rope socket having a cone shaped basket. Molten zinc is then poured around the wires. The equalization of load to each wire and strand during testing is in direct proportion to the care and skill used in the socketing operation. Ropes tested to destruction should fail in at least 50 per cent of the strands simultaneously. Single strand breaks usually occur because of poor socketing or deficient rope making.

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THE measurement of elastic strain is done with special extensometers having a gage length of approximately 3 ft. and arranged to compensate for the relatively high torsion which takes place on application of load. The determination of elastic modulus is made on pre-stressed specimens. The amount of pre-stressing necessary to obtain a consistent stress-strain relation is dependent upon the compressibility of the core, the diameter of the core, the radial pressure applied to the strands during the manufacture of the rope, and the internal stresses present. Ropes are usually pre-stressed to the working load before determining the elastic constants. The life of a rope may be divided into three periods during which it undergoes changes in elastic behavior. During the first period the stress-strain relation changes rapidly. This represents the gradual seating of strands into the core. During the second period, the stress-strain relation remains reasonably constant, as the strands become firmly seated and con-

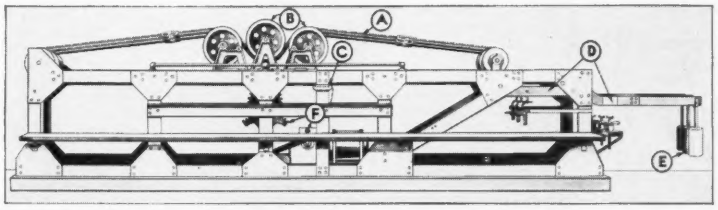

Fig. 5. Fatigue Testing Apparatus for Wire Rope. ✦ ✦ ✦ ✦ ✦ ✦
The test specimens, A, reaved around the test sheaves, B, and reciprocated by the mechanism, F, thus subjecting the ropes to reverse bends. The proper rope tension is maintained at all times by means of the compound lever system, D, and weight, E. Cycles of reverse bends are recorded by counter, C.

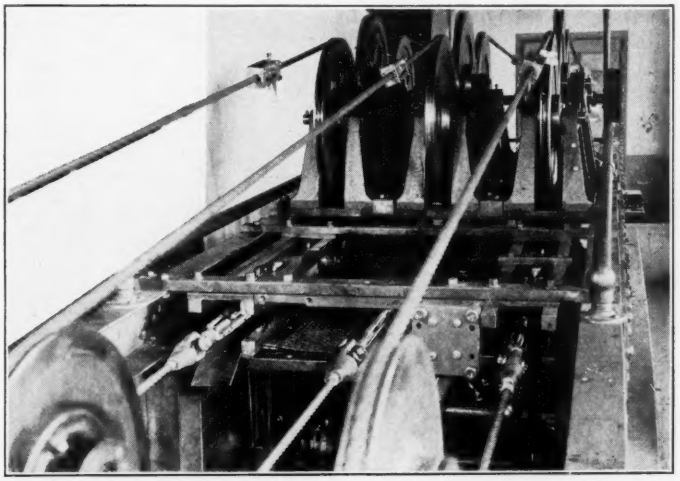

Fig. 6. Sheaves Detail Rope Testing Machine. ✦ ✦ ✦ ✦ ✦ ✦

*A paper presented at the annual meeting of the American Society of Testing Materials, June 1932.

[1]Walter A. Scoble, First, Second, Third and Fourth Reports of the Wire Rope Research Committee, **Proceedings,** Inst. Mechanical Engrs. (British), October, 1920, p. 835; December, 1924, p. 1193; April, 1928; and June, 1930.

[2]R. Woernle, **Zeitschrift des Verneines Deutscher Ingenieure,** Vol. 73, p. 417 (1929); Vol. 74, p. 1417 (1930); Vol. 75, p. 1485 (1931).

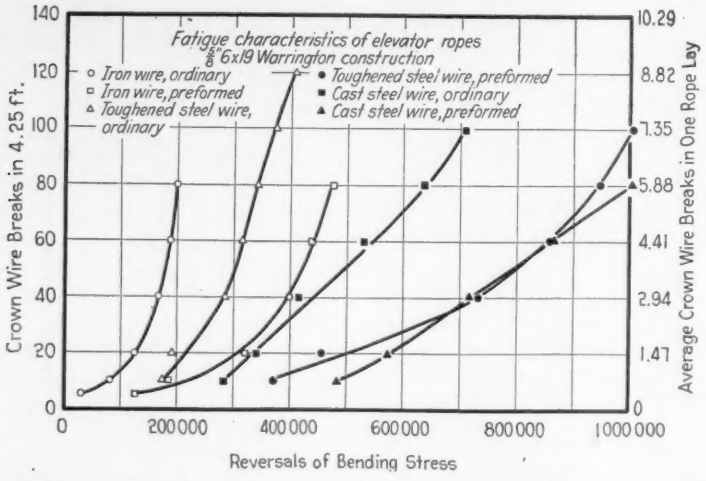

Fig. 7. Fatigue Life Characteristics of Elevator Rope, Preformed and Non-Preformed, Made of Different Materials.

Sheave Diameter=32 rope diameters. Load in tension=5 per cent of breaking strength. All tests discontinued at 13 crown wire breaks per lay.

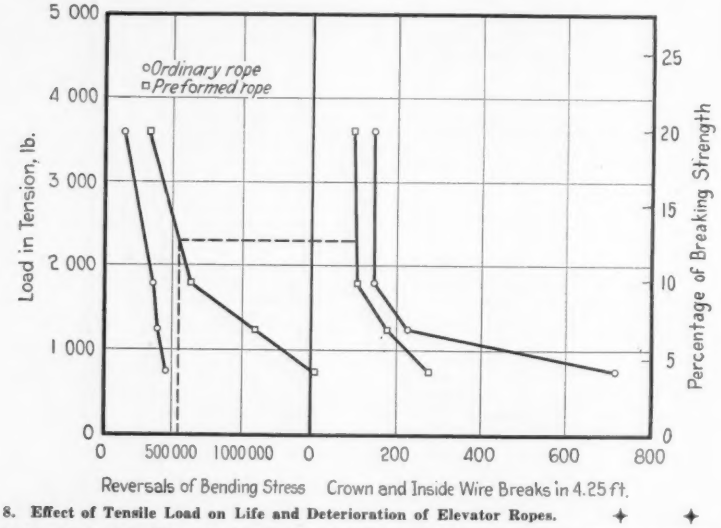

Fig. 8. Effect of Tensile Load on Life and Deterioration of Elevator Ropes.

Effect of tensile load on life and deterioration of traction steel elevator rope. Sheave diameter=32 rope diameters. All tests discontinued at 13 crown wire breaks per rope lay.

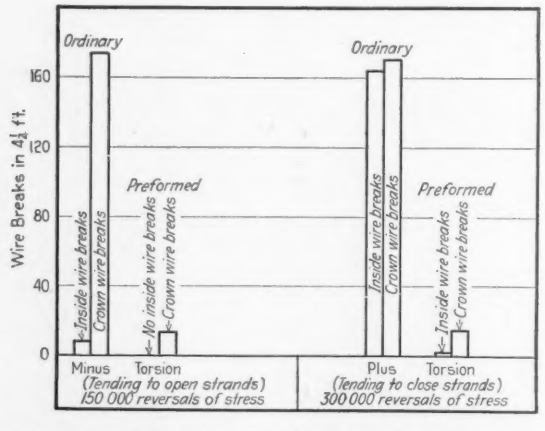

Fig. 9. Effect of Externally Applied Torsional Stress on the Life and Deterioration of Elevator Ropes.

⅝-in.—6x19 Warrington toughened steel elevator rope. Sheave diameter=32 rope diameters. Tension=10 per cent breaking strength. Applied torsion=±4.5 deg. per rope lay.

centrically spaced. During the third period, usually accompanied by the development of wire failures, the rope is "dead," and the strands locked together, it has relatively less elasticity and consequently less ability to absorb shock loads. The definiteness of these periods is, of course, dependent upon the character of rope and type of service.

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AS the inherent advantage of using wire rope lies in its flexibility combined with high strength, the life of a rope subject to alternate bending is of interest to the rope designer as well as to the user. Several extended researches have been conducted on this subject by rope manufacturers, but little information is available in the literature. The work conducted by the British Institution of Mechanical Engineers[1] and Dr. Woernle[2] are by far the most comprehensive researches reported. Neither group has concluded its work.

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AN ideal endurance test for wire rope should permit the application of the combined stresses of bending, tension and torsion to the specimen in the desired ratio. Many test methods have been developed for this purpose. Eight years of endurance testing have resulted in the gradual evolution of the testing equipment illustrated by Fig. 5. The sheave arrangement is shown in better detail in Fig. 6. The rope is passed back and forth over the test sheaves and subjected to 6 reversals of bending stress per cycle. Constant tension is applied to the specimen through the end sheaves by a lever weighing system. The specimen is twisted, held neutral, or untwisted at the end fastenings and held in position or rotated as desired. Under ordinary conditions of testing, bending stresses are applied in one plane only.

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TEST procedure involves keeping a record of the cycles of bending stress, determining the stretch of the rope at increments of reversals and the deterioration as evidenced by the number of broken wires in the individual

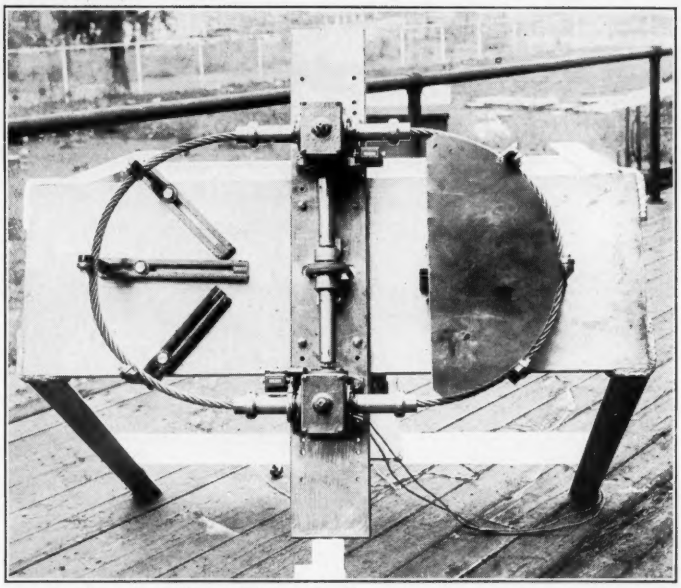


Fig. 10. "Smoke Ring" Bend Testing Machine for Rope.

strands. The end point of the test, as in practical use, is usually considered to be the point at which a predetermined number of wire breaks appear within one foot. This unit length is used for convenience and is often converted to a function of the rope lay for comparative purposes. Occasionally tests are continued to complete failure. The ratio of breaks per rope lay to breaks in the full length of specimen subject to bending stress is of interest in indicating probable life in service under applications of suddenly applied load. After the test is completed the rope is completely dissected and a *post mortem* analysis made of its condition. All wire breaks are recorded in relation to their location in the strand and in the rope and the condition of the core is noted. Wire breaks are classified as follows:

Crown Wire Breaks.—Breaks visible on the outer strand crowns.

Valley Breaks.—Breaks occurring at a point adjacent to strand contact accompanied by wire nicks and usually caused by core collapse or inadequate core.

Inside Breaks.—Breaks occurring on the outer series of wires but adjacent to the core, not normally visible.

Inner Wire Breaks.—Breaks occurring in the inner series of wires, not normally visible.

Core Wire Breaks.—Failure of the core or king wire.

✦ ✦ ✦

OCCASIONALLY ropes are removed from the fatigue machine at various stages of deterioration and subjected to tension tests to determine the loss in strength. This procedure is in general unsatisfactory, as after the rope is tested the evidence is destroyed. The reserve strength developed by a rope which has a large number of broken wires is largely dependent upon the extent of core collapse and the resultant friction developed between strands, and the rope lay. Proper socketing is also essential.

✦ ✦ ✦

THE relative life-deterioration relationship for ropes made of iron, toughened steel, and cast steel wire is shown in Fig. 7. The effect of preforming on this relationship is also shown.

✦ ✦ ✦

THE effect of varying the tensile load upon the life of traction steel elevator ropes is shown in Fig. 8.

✦ ✦ ✦

THE effect of varying the torsional stress upon the life of traction steel elevator ropes is shown in Fig. 9. It is a common but condemned practice to equalize the length of parallel elevator hoist ropes by twisting or untwisting the ropes during installation. Building managers are then greatly surprised when one or two of the ropes are in much better condition than the remainder when removed. The application of external torsional stress is often a contributing factor.

✦ ✦ ✦

ANOTHER form of testing machine known variously as the "doughnut" or "smoke ring" machine developed for the purpose of subjecting a rope to bending stress with no tension or shear is illustrated in Fig. 10. The rope

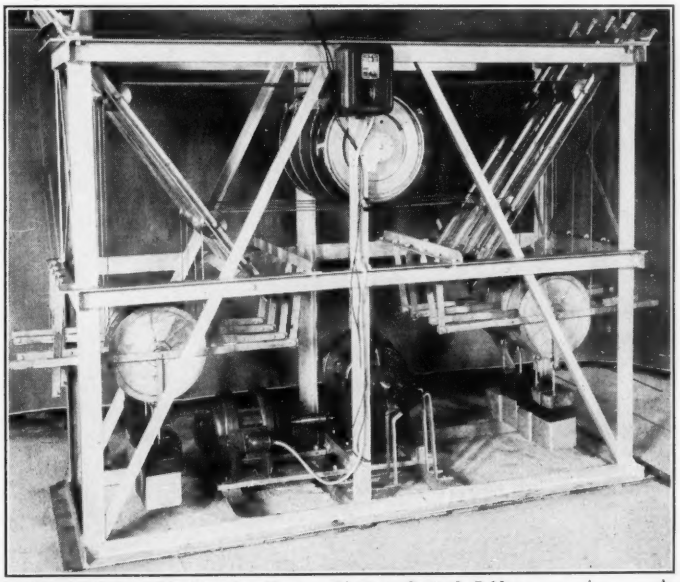


Fig. 11. Warner Fatigue Machine for Testing Aircraft Control Cables.

Save on Your

Winding Costs

With Winco PRODUCTS FOURX Enameled Wire

▲ ▲ ▲ All wire meets the most exacting requirements ▲ ▲ ▲

Winco PRODUCTS 4X Enameled Wire has been developed to replace single silk covered and single silk over enameled wire in the winding of small motor armatures, fans, high frequency radio transformer coils and other apparatus where high insulation values and ability to resist abrasion, are prime factors.

▲ ▲ ▲

Winco PRODUCTS 4X Enameled Wire is covered to the same dimensions as the fabric covered wires, and can therefore be wound without changes in armature slots, bobbins or winding jigs.

▲ ▲ ▲

Is superior in its ability to withstand high temperatures.

▲ ▲ ▲

Will withstand softening in the varnish dipping and baking operations.

▲ ▲ ▲

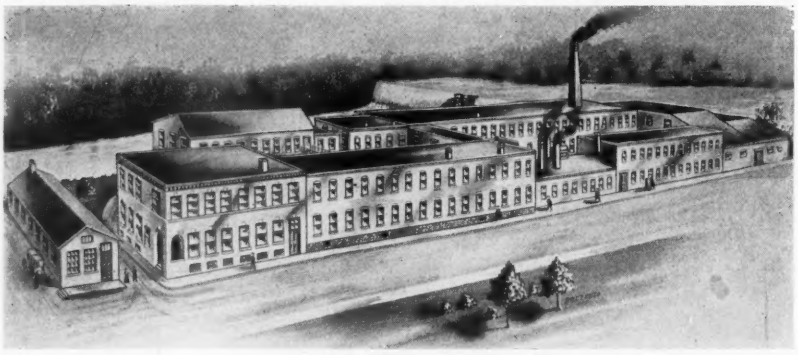
Requires little or no change in winding practice.

▲ ▲ ▲

Costs substantially less than the silk covered wire.

▲ ▲ ▲

Write for samples.



GENERAL VIEW OF PLANT, WINSTED, CONN. ▲ ▲ ▲

Products of leakage currents attack insulation and shorten the life of the coil. ▲ ▲

The only test indicating what the leakage loss in a winding may be is the test in mercury, which reveals the weak spots in the enamel covering. ▲ ▲ ▲

Our method of testing all wire by mercury test before shipment is calculated to give the user the highest degree of protection. ▲ ▲ ▲

ALL Winco PRODUCTS WIRE

GUARANTEED LEAK PROOF ▲▲▲

We would be pleased to quote on your requirements.

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Incorporated

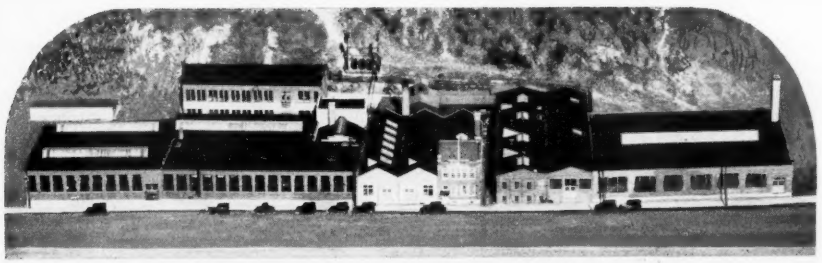
Winsted, Connecticut

"HUDCO" PRODUCTS...

Specially Processed Copper Wire...

For Enameling Purposes...

▲ ▲ ▲ Electrolytic and Oxygen Free ▲ ▲ ▲



AERIAL VIEW OF PLANT OF HUDSON WIRE CO., OSSINING, N. Y. ▲ ▲ ▲
▼ ▼ ▼ FINE WIRE MANUFACTURERS ▼ ▼ ▼

"HUDCO" High Conductivity Electric Wire

OTHER FINE BARE WIRES

High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Cadmium, 10%, 18% and 30% Nickel Silver, Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification.

BRUSH WIRES, CRIMP and STRAIGHT

Brass, Steel, Nickel Silver, Copper and Phosphor Bronze

TINSEL LAHNS

Silver Plated Copper, False Gold and Copper

METALLIC FIBRE FOR PACKING PURPOSES

Copper, Bronze, Zinc, Lead and Aluminum

WIRES FOR METAL SPRAYING

Zinc, Tin, Lead, Cadmium, Copper, Bronzes, Nickel Silver, Aluminum and other wires to specification.

ROLLED FLAT WIRE WITH ROUND EDGES

Copper, Brass, Nickel Silver, Zinc, Lead, Phosphor Bronze and other wires to specification.

"Hudco" copper wire is drawn by the Hudson Wire Company of Ossining, N. Y., who have been specialists in the manufacture of fine wires for over thirty years. ▲

The best grade of copper drawing stock is used, insuring the maximum conductivity. ▲ ▲ ▲

A new process of drawing and annealing is used which produces a wire unusually smooth, clean and uniform in color for enameling and other purposes. ▲ ▲ ▲

Painstaking care in the selection and maintenance of dies guarantees a product accurate to gauge and resistance. ▲ ▲ ▲

You can rely on "Hudco" wire always. ▲ ▲ ▲

Expert annealing of the wire prevents unnecessary breakage when winding the wire into coils ▲ ▲ ▲

If you, too, have a specific problem demanding wire of exact requirements, write to us about it. ▲ ▲ ▲

It costs nothing and involves you in nothing. ▲ ▲ ▲

Better wire at lower cost. ▲ ▲ ▲

We can serve you quickly and economically.
Send in your specifications for a quotation.

"HUDCO"
FINE WIRES

HUDSON WIRE COMPANY

Ossining, N. Y.

Successors ROYLE & AKIN

"HUDCO"
FINE WIRES

Estab. 1902

Estab. 1902

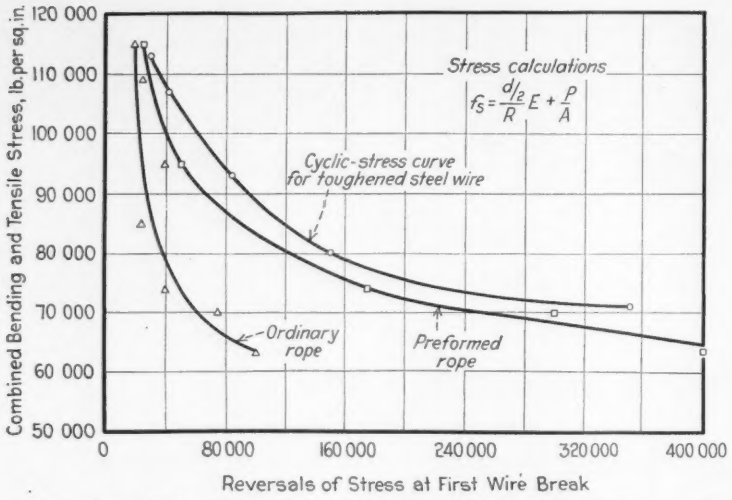


Fig. 12. Comparison of Endurance Properties of Single Wire and Those of Wire in Rope. Wire.—Toughened Steel. **Rope.**—⅝-in. 6x19 Warrington Toughened Steel Elevator Rope.

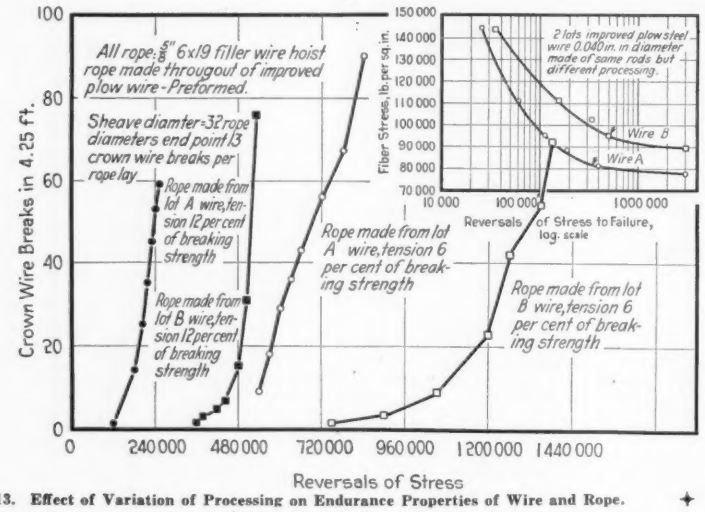

Crown Wire Breaks in 4.25 ft.
100
80
60
40
20
0
All rope: ⅝" 6x19 filler wire hoist rope made throughout of improved plow wire - Preformed.
Sheave diam = 32 rope diameters end point 13 crown wire breaks per rope lay
Rope made from lot A wire, tension 12 per cent of breaking strength
Rope made from lot B wire, tension 12 per cent of breaking strength
Rope made from lot A wire, tension 6 per cent of breaking strength
Rope made from lot B wire, tension 6 per cent of breaking strength
Fiber Stress, lb. per sq. in.
150 000
140 000
130 000
120 000
110 000
100 000
90 000
80 000
70 000
2 lots improved plow steel wire 0.040 in. in diameter made of same rods but different processing.
Wire B
Wire A
10 000
100 000
1 000 000
Reversals of Stress to Failure, log. scale
0
240 000
480 000
720 000
960 000
1 200 000
1 440 000
Reversals of Stress

Fig. 13. Effect of Variation of Processing on Endurance Properties of Wire and Rope.

specimen is formed into an arc of known curvature and having a length of 180 deg. The two ends of the rope are clamped in chucks of the spring collet type which are positively rotated in the same direction and at the same speed. The rope "floats" between chucks with the aid of suitable supports. The type of rope failure obtained on this machine is typical of service failures in installations where the bending stress is high in relation to the tensile stress. Ropes which are not properly designed with respect to wire sizes respond very quickly to this treatment by showing their internal friction in the form of heat.

WOERNLE has developed a similar machine for rope testing in which the rope is held under tension against a quadrant and rotated axially. Combined bending and tension stresses are thus obtained. No results of tests made on this type of machine are available.

✦ ✦ ✦

THE fatigue testing of small flexible cables such as are used for aircraft control cables is carried on continuously by the War and Navy Departments. The current standard specifications require that a ⅛-in.—7x19 tinned or galvanized control cable develops at least 50 per cent of the original minimum strength after 300,000 reversals around a 1⅜-in. pitch diameter sheave. Figure 11 illustrates the type of testing apparatus used for testing this type of cable. This machine was designed by D. A. Warner of the Materiel Division, War Department at Wright Field. The test specimens are reaved around the test sheaves and the large load sheave. The rope ends are fastened to the central drum which oscillates through an arc, thus producing alternate bending and straightening of the specimen. After the machine has produced the required oscillations it stops automatically. The cables are removed and the reserve strength determined by tension tests. The machine is exceptionally smooth in operation due to the light weight of all moving parts.

✦ ✦ ✦

THE correlation of properties of components to the performance of the complete structure is the ultimate aim of all testing. The correlation of fatigue properties of wire to the life of rope in the field is an extremely hazardous undertaking because of the constantly changing conditions, but it is evident that, other things being equal, increasing the fatigue properties of the wire will improve the life of the rope.

✦ ✦ ✦

AN ideal rope should last as long as a single wire when subject to the same bending stress before a single wire fails. Figure 12 shows the effect of preforming on the life of a single wire in a rope as compared with the endurance properties determined on the single wire.

✦ ✦ ✦

THE "life" curves of the preformed rope and single wire are practically parallel whereas the data for the non-preformed rope is erratic and the "life" curve departs considerably from the ideal. These tests were made on toughened steel wire and ⅝-in.—6x19 Warrington toughened steel elevator ropes incorporating the single wire as the large wire in the outer series.

✦ ✦ ✦

AN interesting series of tests has been completed on the correlation of process variations on

(*Please turn to page 440*)

The Wire Industry

As Shown By The Census of Manufactures for 1931

A Decrease of 56.1 Per Cent. as Compared with 1929, the Last Preceding Census Year, is Shown in the Report Following.

THE Bureau of the Census announces that, according to a preliminary tabulation of data collected in the Census of Manufactures taken in 1932, the combined value of wire for sale and for interplant transfer, and of wire products for sale, manufactured in the United States in 1931 amounted to $403,598,789 (at f. o. b. factory prices), a decrease of 56.1 per cent as compared with $919,988,031 reported for 1929, the last preceding census year.

✦ ✦ ✦

THE production of wire was as follows: Plain iron and steel wire, 1,868,910 tons (of 2,000 pounds); copper wire, 454,801,987 pounds; brass and bronze wire, 53,097,552 pounds; other nonferrous wire, 26,780,761 pounds. These amounts show decreases of 39.7, 58.8, 42.5 and 44.8 per cent, respectively, as compared with 3,097,239 tons of plain iron and steel wire, 1,104,497,194 pounds of copper wire, 92,386,093 pounds of brass and bronze wire, and 48,508,080 pounds of other nonferrous wire made in 1929. The foregoing figures cover both wire made for sale and interplant transfer and that made and consumed in the same plants in the manufacture of fabricated wire products. (The total values as given in the preceding paragraph do not include data for wire made and consumed in the same plants.)

✦ ✦ ✦

THE more important of the products made from iron and steel wire in 1931 were as follows: Rope or cable, except insulated, 56,799 tons, valued at $18,266,635; strand, galvanized, 35,580 tons, $3,283,509; nails, brads, and spikes, 8,207,920 kegs (of 100 pounds), $22,585,646; woven-wire fence, except poultry netting, 245,282 tons, $17,760,085; poultry netting, 31,988 tons, $4,164,838; barbed wire, 161,813 tons, $8,280,455; fly screening, 31,718,816 pounds, $4,622,679; other wire cloth, 24,693,268 pounds, $4,155,193; concrete-reinforcement wire, 140,131 tons, $8,177,315; automobile skid chain, 24,875 tons, $5,870,505; bale ties, 109,349,434 pounds, $3,592,828; welding wire, including electrodes, $2,850,906; wire springs, $25,631,478. The leading products made from nonferrous-metal wire were: Copper fly screening, 2,697,241 pounds, $779,830; nonferrous-metal fly screening other than copper, 7,131,884 pounds, $2,380,646; Fourdrinier and cylinder wire cloth, 1,899,155 pounds, $3,081,552; copper strand, except insulated, 59,050,913 pounds, $7,383,190; insulated wire and cable, $120,630,810.

✦ ✦ ✦

THE drawing of wire was reported by 150 establishments, of which 81 drew wire from purchased bars or rods, 39 were operated as departments of iron and steel rolling mills, and 30 were operated as departments of non-ferrous-metal rolling mills and other establishments. The number of establishments engaged primarily in the manufacture of wire products from purchased wire was 568. In addition, fabricated wire was also reported as a secondary product by establishments engaged primarily in other lines of manufacture.

✦ ✦ ✦

THE statistics for 1931, with comparative figures for 1929, are given in the following table. They cover the total production of wire and the specified fabricated wire products in all industries in which they are made either as primary or as secondary products. The figures for 1931 are preliminary and subject to revision.

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WIRE

Table 1. Total Production.
Table 2. Bare Wire.
Table 3. Iron and Steel Wire.
Table 4. Copper Wire.

WIRE

Table 5. Brass and Bronze Wire.
Table 6. Other Non-Ferrous Wire.
Table 7. Total Production.

WIRE PRODUCTS

Table 8. Iron and Steel Wire Products.
Table 9. Non-Ferrous Wire Products
Table 10. Insulated Wire and Cable.

Wire and Wire Products

Production, by Class, Kind, Quality and Value: 1931 and 1929 (Ton, 2,000 pounds)

TABLE 1
Wire Production Totals

Class and kind	1931 Quantity	1931 Value	1929 Quantity	1929 Value
Wire and wire products, aggregate value	.....	$403,598,789	.....	$919,988,031
Made in—				
Wire mills (establishments drawing wire from purchased rods)	.....	77,916,238	.....	1/192,439,764
Wire-drawing departments of steel works and rolling mills	.....	99,625,611	.....	200,197,286
Wire-drawing departments of non-ferrous rolling mills and other establishments	.....	79,124,347	.....	1/160,872,488
Establishments using purchased wire as material	.....	146,932,593	.....	366,478,493

TABLE 2
Bare Wire

Class and kind	1931 Quantity	1931 Value	1929 Quantity	1929 Value
Iron and steel (plain) wire, tons	1,868,910	.....	3,097,239	.....
Copper, pounds	454,801,987	.....	1,104,497,194	.....
Brass and bronze, pounds	53.097,552	.....	92,386,093	.....
Other nonferrous, pounds	26,780,761	.....	48,508,080	.....

TABLE 3
Iron and Steel Wire

Plain wire—				
For sale, tons	534,749	$36,391,841	1,074,076	$78,992,298
Transferred to other plants of same company (assigned value), tons	72,156	4,830,850	129,567	9,463,755
Produced and consumed in same works, including that subsequently galvanized or otherwise coated, and cold-rolled (no value assigned), tons	1,261,909	.....	1,891,268	.....
Drawn on contract or custom basis from rods owned by others, tons	96	.....	2,328	.....
Galvanized—				
For sale and interplant transfer, tons	171,722	10,963,179	268,793	19,656,380
Produced and consumed in same works (no value assigned), tons	397,045	.....	574,402	.....
Other coated wire—				
For sale and interplant transfer, tons	43,398	5,163,961	52,242	8,143,031
Produced and consumed in same works (no value assigned), tons	3,490	.....	4,805	.....
Cold-rolled from drawn wire—				
For sale and interplant transfer, tons	13,726	2,361,291	28,757	4,255,839
Produced and consumed in same works (no value assigned), tons	13,859	.....	14,271	.....

TABLE 4
Copper Wire

For sale and interplant transfer, pounds	187,920,561	22,883,779	544,740,189	118,627,983
Produced and consumed in same works (no value assigned), pounds	242,389,775	.....	407,996,224	.....
Drown on contract or custom basis from rods or bars owned by others, pounds	24,491,651	.....	151,760,781	.....

TABLE 5
Brass and Bronze Wire

For sale, pounds	43,628,853	7,293,389	81,482,823	19,091,773
Transferred to other plants of same company (assigned value), pounds	4,402,352	611,107	5,322,571	1,240,719
Produced and consumed in same works (no value assigned), pounds	5,066,347	.....	5,580,699	.....

TABLE 6
Other Nonferrous Wire

For sale and interplant transfer	26,750,195	10,213,998	48,487,180	23,589,716
Produced and consumed in same works (no value assigned), pounds	30,566	.....	20,900	.....

WIRE PRODUCTS

Production, by Class, Kind, Quantity, and Value: 1931 and 1929—Continued

(Ton, 2,000 pounds)

TABLE 7

Wire Products—Totals

Class and kind	1931 Quantity	1931 Value	1929 Quantity	1929 Value
Wire products—Total value	.....	$302,885,394	.....	$636,926,537
Wire products except insulated wire and cable, total value	.....	182,254,584	.....	324,334,444

TABLE 8

Iron and Steel Wire Products

Nails, brads, and spikes, kegs (100 pounds), total 3/	8,207,920	22,585,646	13,600,673	44,934,890
Bright, not including galvanized and other coated, kegs (100 pounds)	6,502,464	16,620,577	10,302,272	31,738,404
Galvanized, kegs (100 pounds)	581,957	2,658,003	1,008,176	5,385,058
Cement coated, kegs (100 pounds)	1,123,499	3,307,066	2,290,225	7,811,428
Tacks, wire, pounds 4/	2,830,734	238,026	6,540,281	640,072
Staples, wire pounds	44,354,703	1,337,516	58,878,705	2,342,378
Barbed wire, plain and coated, tons	161,813	8,280,455	221,809	13,824,143
Rope or cable, except insulated, tons	56,799	18,266,635	153,304	46,876,871
Strand, galvanized, tons	35,580	3,283,509	48,565	5,617,900
Poultry netting, tons	31.988	4,164,838	46,733	7,536,147
Woven-wire fence, except poultry netting, tons	245,282	17,760,085	365,505	31,041.091
Fly screening, pounds	31,718,816	4,622,679	64,728,176	9,942,027
Other wire cloth				
Quantity reported, pounds	24,693,268	4,155,193	31,106,928	4,995,659
Quantity not reported	.....	.....	.....	1,559,316
Concrete-reinforcement wire, tons	140,131	8,177,315		
Wire lath, tons	10,132	798,239	5/138,830	5/11,786,472
Other woven wire, tons	17,615	4,705,109		
Bale ties, pounds	109,349,434	3,592,828	148,474,426	5,088,035
Wire springs, total value	.....	25,631,478	.....	47,903,132
Furniture and other upholstery (including mattress) springs	.....	14,440,206	.....	25,344,315
Valve springs for internal-combustion engines	.....	1,884,702	.....	3,314,728
Miscellaneous spiral springs	.....	5,528,510	.....	10,954,730
Flat springs, coiled	.....	1,108,302	.....	3,107,429
Other wire springs	.....	2,669,758	.....	5,181,930
Automobile skid chain—				
Quantity reported	24,875	5,870,505	31,445	8,987,494
Quantity not reported	.....	.....	.....	2,503,907
Other chain	.....	1,551,832		
Welding wire, including electrodes—				
Quantity reported, pounds	20,262,827	1,274,752	.....	42,872,319
Quantity not reported	.....	1,576,154		
Other fabricated iron and steel wire products	.....	23,478,880		

TABLE 9

Non-Ferrous Wire Products

Class and kind	1931 Quantity	1931 Value	1929 Quantity	1929 Value
Fly screening—				
Copper, pounds	2,697.241	$779,830	4,993,338	$1,768,291
Other metals, pounds	7,131,884	2,380,646	10,210,589	3,336,196
Fourdrinier and cylinder wire cloth, pounds	1,899,155	3,081,552	3,107,604	4,764,950
Other wire cloth—				
Copper, pounds	368,184	138,564	1,168,029	587,986
Other metals, pounds	1,211,709	1,067,438	1,450,097	683,489
Copper strand, except insulated, pounds	59,050,913	7,383,190	92,395,338	18,616,600
Other fabricated nonferrous wire products, except insulated wire—				
Copper	.....	3,970,686	.....	1,905,640
Brass	.....	1,266,208	.....	2,471,938
Other metals	.....	437,812	.....	1,747,501
Fabricated wire products not distributed by classes shown above	.....	396,984	.....	.....

WIRE PRODUCTS

Production, by Class, Kind, Quantity, and Value: 1931 and 1929—Continued

(Ton, 2,000 pounds)

TABLE 10

Insulated Wire and Cable

Insulated wire and cable, total value		120,630,810		312,592,093
Rubber-insulated—				
Lighting and power circuit—				
Braided		22,516,979		51,130,555
Leased..		8,859,493		23,037,318
Telephone		6,648,539		11,742,261
Flexible cords (rubber insulation, cotton and silk covered)		7,717,411		20,189,102
Cotton-insulated, weather-proof		13,055,853		42,011,680
Paper-insulated—				
Lighting and power circuit and telephone and telegraph cable (including submarine)		37,020,651		96,227,728
Varnished-cambric insulated		3,289,296		7,209,890
Magnet—				
Cotton and silk covered		4,877,549		18,777,088
Enameled		6,157,775		30,641,417
Cotton insulated slow burning, and asbestos insulated		2,530,446		11,625,054
Other insulated wire and that not distributed by kind of insulation		7,856,818		

1/ Not strictly comparable with 1931 item because of transfer of certain establishments from "Wire mills(establishments drawing wire from purchased rods)" group to "Wire-drawing departments of nonferrous rolling mills and other establishments" group.

2/ Aluminum, nickel, and alloys.

3/ Not including cut nails and spikes.

4/ Not including cut tacks.

5/ Not comparable with 1931 figures because of the facts that data for concrete-reinforcement wire and wire lath were not called for separately for 1929 and that consequently some manufacturers reported these products under other items, principally "Other fabricated iron and steel products."

6/ Wire guards, partitions, and grilles, kitchen wire goods, floral designs, wire lamp-shade frames, bird cages, garment hangers, etc.

Production of Steel Wire In Canada

THE **(Canadian)** Bureau of Statistics has just released its report on the production and sale of steel wire in the Dominion in 1931. According to these figures a total of 221,731,292 pounds of plain wire made in that year as compared with 297,009,260 pounds made in 1930. Sales are reported to have amounted to 42,556,818 pounds (60,340,499 pounds in 1930) with the producing companies enjoying a profit of $1,446,997 from these sales. Galvanized wire production totaled 62,579,211 pounds (94,469,208 pounds in 1930), direct sales 26,344,303 pounds (37,768,450 pounds), and income from sales $853,049 ($1,381,815). Of other coated wire 8,030,749 pounds (9,792,324 pounds in 1930) were made in 1931, 6,877,448 pounds (7,898,893 pounds) having been sold and a profit of $305,660 ($393,689) realized from these sales. Barbed wire sales—12,466,120 pounds in 1931 (16,720,942 pounds in 1930) exceeded production which had amounted to only 8,743,437 pounds (17,687,834 pounds) while profits from sales aggregated only $376,291 as compared with $535,131 in the preceding year. The report further states that 15 plants engaged in the production of this wire in 1931 of which 7 were situated in Ontario, 5 in Quebec, and 1 each in Nova Scotia, British Columbia and New Brunswick.

(Note: In the original report it was explained that the figures of the output of plain wire included the amounts made and used in subsequent processes in the same plants such as the manufacture of nails, screws, galvanized wire, etc.)

Screw Products Standards Set

THE Canadian Engineering Standards Association, Ottawa, **Canada,** has just published "Established lists of Dimensional Standards" covering cap screws, set screws and studs, common and semi-finished, alloted and castellated hexagon nuts, etc. This publication, which is priced at 25c per copy, should be of interest to American manufacturers of screw machine products.

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THE WIRE ASSOCIATION
17 East 42nd Street New York, N. Y.

Exports and Imports of Wire

Exports of iron and steel wire products in July and August, 1932
(In gross tons)

	August 1932	July 1932	August 1931
Wire rods	469	111	2,167
Hoops, bands, and strip steel	648	1,598	1,811
Plain black or galvanized iron or steel wire	318	491	1,417
Barbed-wire and woven wire fencing	906	1,313	2,342
Woven wire screen cloth	49	76	74
Wire rope	72	170	144
Insulated iron or steel wire and cable	5	5	24
Other wire and manufactures	188	187	320
Wire nails	331	1,153	622
Tacks	24	34	40
Other nails, including staples	159	185	221
Bolts, machine screws, nuts, rivets and washers	153	297	401
Total, these 12 classifications	3,322	5,620	9,583

Imports of iron and steel wire and wire products into the United States
(In gross tons)

Concrete reinforcement and other bars	2,064	4,024	7,443
Wire rods	395	267	333
Barbed wire	859	1,254	962
Round iron and steel wire	68	156	150
Telephone and telegraph wire		3	1
Flat wire and strip steel	113	567	50
Wire rope and strand	103	70	121
Other wire	85	157	31
Hoops and bands	5,664	4,188	1,946
Nails, tacks and staples	671	1,043	1,305
Bolts, nuts and rivets	38	17	37
Total, these 11 classifications	10,060	11,746	12,379

Exports of iron and steel wire products in August and September, 1932
(In gross tons)

	September 1932	August 1932	September 1931
Wire rods	2,313	469	2,675
Hoops, bands, and strip steel	1,043	648	1,098
Plain black or galvanized iron or steel wire	491	318	835
Barbed-wire and woven wire fencing	367	906	1,005
Woven wire screen cloth	44	49	55
Wire rope	104	72	211
Insulated iron or steel wire and cable	4	5	6
Other wire and manufactures	128	188	672
Wire nails	456	331	340
Tacks	23	24	37
Other nails, including staples	188	159	234
Bolts, machine screws, nuts, rivets and washers	223	153	272
Total, these 12 classifications	5,384	3,322	7,440

Imports of iron and steel wire and wire products into the United States
(In gross tons)

Concrete reinforcement bars	1,181	533	3,571
Hollow bars and drill steel	125	99	127
Merchant steel bars	1,193	1,432	4,676
Wire rods	862	395	593
Barbed wire	748	859	404
Round iron and steel wire	107	68	138
Telephone and telegraph wire			
Flat wire and strip steel	88	113	74
Wire rope and strand	143	103	177
Other wire	48	85	21
Hoops and bands	3,062	5,664	2,857
Nails, tacks and staples	762	671	446
Bolts, nuts and rivets	12	38	57
Total, these 13 classifications	8,331	10,060	13,141

September Summary

IN September, 36,038 gross tons of iron and steel products were exported as compared with 32,955 tons in August.

THE import trade also increased in September—climbing 5,618 tons to total 29,241 tons. Gains in receipts of scrap, rails and structural shapes featured this trade.

AMONG the principal exports in September, scrap continued to be the first item from a tonnage standpoint. Wire rods totaled 1,844 tons while skelp registered a decrease of 1,989 tons.

✦ ✦ ✦

CANADA continued as the chief purchaser of iron and steel products with Japan a close second, taking 2,257 tons of wire rods among other products.

✦ ✦ ✦

AMONG the imports, the only decrease of moment was that in hoops and bands a matter of 2,602 tons. Belgium shipped us 2,295 tons of hoops and bands, 1,181 of concrete reinforcing bars, and 961 tons of merchant steel bars. Imports from Germany included 724 tons of wire nails and 628 tons of barbed wire.

✦ ✦ ✦

RECEIPTS of card clothing rose to 3,025 square feet ($2,552)—2,970 square feet ($2,328) of which came from the United Kingdom and the balance from France.

✦ ✦ ✦

WIRE cloth and screening imports declined to only 13,486 square feet of which 7,709 square feet came from Canada and 5,777 square feet from France.

✦ ✦ ✦

FOURDRINIER wire receipts—90,251 square feet—somewhat increased over August included 42,344 square feet from Austria, 31,083 square feet from Germany with the balance coming from Sweden and France.

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WIRE fencing and netting imports were slightly reduced in September—receipts of that galvanized before weaving totaling 2,046,896 square feet including 1,809,271 square feet from Germany and the balance from the Netherlands and Belgium while that galvanized after weaving amounted to 2,302,665 square feet of which 1,401,215 square feet came from Germany, 851,300 square feet from the Netherlands and the balance from Belgium.

✦ ✦ ✦

WIRE heddle imports were small at 787,00-760,000 of which came from France.

'Round the World With the Wire Industry

Devises New Wire-Testing Apparatus

FOR some time past Professor F. C. Thompson, eminent British iron and steel technologist, has been carrying out a series of painstaking investigations into the wire-drawing process, which, he says, "affords scope for endless researches." In considering the relation of tension and drawing speed Professor Thompson designed a special apparatus with which to calculate the results of his research.

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THIS apparatus consists essentially of a strong horizontal arm of channel section pivoted at its center. The die is bolted to this arm at one end, and through a hole in the arm the wire is drawn on to a drum. As a result of the pull thus set up the lever arm carrying the die tends to move forward and is brought back into its original position by means of a piston which presses against the other end. This piston is actuated by means of a cylinder into which compressed air can be forced under very sensitively controlled conditions. The undeflected position of the whole arm is determined by means of two electrical contacts, and when this state of affairs is attained, the air pressure, in pounds per square inch, in the cylinder, which is measured on one or other of two pressure gauges, is exactly one-tenth of the pull in pounds upon the wire.

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THE results of Professor Thompson's investigations are awaited with keen interest.

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Thames Cables Suspended

ELECTRIC cables with spans of over 1,000 yards were laid on the bed of the River Thames near Dagenham on a recent Sunday. At a subsequent low water the cables were raised by huge cranes and connected to the pylons at Dagenham and Crossness.

THESE pylons are 487 feet high and are the highest cable-carrying towers in the world. The cables, when suspended, give all shipping at high water a clearance of 25 feet. There are seven cables. When they were being laid down special boats were on duty to warn shipping.

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THE towers carry two circuits, each of three cables operating at 132,000 volts, and form the connecting link over the Thames between the British Electricity Board's grid system in Essex and that in Kent.

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Big British Cable Order

ONE of the largest cable orders placed in Britain for a considerable period has just been obtained by the Macintosh Cable Co., Derby, for the supply and laying of cables in connection with the South-West England electricity project of the Central Electricity Board. The value of the contract, it is announced, is substantially in advance of £100,000 ($500,000).

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Experiments with Wire-Drawing Lubricants

THE wire-drawing experiments that have recently been carried out by Professor F. C. Thompson, the Manchester metallurgist, suggest that the best lubricant for the process is hard soap. In the non-ferrous wire-drawing trades, however, iquid or greasy lubricants are almost invariably preferred to solid soap. But a further point of interest which has arisen out of Professor Thompson's investigations is that, while in practice care is taken to cool the lubricant, he has ascertained that if the temperature is permitted to rise (to the boiling point of water, for example) then some greasy or liquid lubricants are equal to, or even superior to, hard soap.

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THE chief consideration of the investigations has been power consumption, an aspect of the problem which naturally appeals strongly to wire-drawers on account of the possibility of reducing operating costs. The professor, however, sounds a note of warning, when he points out that this is "only one of the problems to be solved. The mechanical properties of the material and the relative costs in other directions are of at least equal importance."

✦ ✦ ✦

THE industry is indebted to Professor Thompson for the valuabe facts which his research has already unearthed.

✦ ✦ ✦

Pirelli Dies at 84

SENATORE Giovanni Battista Pirelli founder of the great Italian rubber and submarine cable manufacturing firm, died at Milan recently, aged 84. He was born at Lake Como, of humble stock, and only with difficulty was able to complete his studies. The winning of a scholarship enabled him to go abroad and study industrial conditions.

✦ ✦ ✦

ON his return he opened the first Italian rubber manufacturing plant with a small capital and 39 hands. Today the Pirelli firm is one of the largest in Italy, and employs thousands of workers making wires and cables. Its cable works on the outskirts of Milan are so large that they give the impression of a village, while the firm has other establishments at Spezia, Villaneuva y Beltru in Spain, Buenos Aires, Southampton, and other places. Connected with the cable works is one of the largest wire-drawing plants in Italy. The truly remarkable development of the firm is due to the activity, intelligence and immense activity of its founder, who in recognition of his labors was awarded the distinction of Cavaliere de Lavoro (Knights of Labor). In 1909 he was also made Senatore.

✦ ✦ ✦

SENATORE Pirelli's son, Dr. Alberto Pirelli, in addition to

taking an active part in the management of the firm, has represented Italy at important international conferences, and on the Young and Dawes Committees. He was formerly a member of the Economic Committee of the League of Nations.

✦ ✦ ✦

Die Material Survey Made by Prof. F. C. Thompson of Manchester University

PROFESSOR F. C. Thompson, well-known metallurgist of Manchester University, who has lately been carrying out an interesting investigation of wire-drawing technique, has made a valuable commentary on the materials used for die production. These include steel both intrinsically hard due to high carbon content, and quenched, chromium and tungsten steels, white cast iron (not much used in Britain), tungsten carbide, diamonds and other precious stones, and even, it is said, possibly in the near future of a specially toughened glass. Much work has been carried out on the relative power required to draw wires through dies of various of these materials. In all the cases examined by Professor Thompson it has become evident that the power consumption is higher with steel dies than with those made from tungsten carbide. It is not unusual to find that an economy of the order of 30 per cent in the power consumed can be effected by the replacement of steel by carbide dies. The length of service of the latter prior to resetting is also substantially greater.

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TUNGSTEN carbide is an intensely hard substance sintered with small amounts of iron, nickel, cobalt, etc. Dies made from it are somewhat susceptible to the thermal stresses set up if the temperature is rapidly altered, and some care in their use is therefore essential if flaking is not to occur. Pre-heating or the use of cooling appliances may be required. However, the difficulties are not great, and with reasonable care the material never ceases to be extremely useful.

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PROFESSOR Thompson states that although he has not yet had much experience of the use of carbide dies for drawing the heavier gauges of wire, they have been employed in his department for wire up to one-tenth of an inch in diameter, with invariably successful results. Not only is there this economy of power already referred to, but with carbide dies materials generally considered rather difficult to draw at high speeds, such as high carbon steels, alloy steels of the stainless types and nickel-chromium alloys, have been drawn with the greatest ease, even when the speed has been as high as, or even higher than, those normally used in industry. For this Professor Thompson says the dies themselves must be held largely responsible.

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THE work so far carried out with diamond dies at Manchester University, though not great, indicates that for those cases where realy efficient lubrication is possible the power consumption is exactly the same as that required for tungsten carbide dies. With the less efficient liquid lubricants, however, the diamond dies are the more economical in the amount of power used.

✦ ✦ ✦

German Wire Exports Less by One-Third

GERMAN exports of iron and steel wire, wire rope, and wire netting during the first six months of 1932 amounted to 123,465 metric tons valued at $6,412,800 a decline of 35 per cent in quantity and 37 per cent in value from the 1931 trade over a like period—192,221 tons valued at $10,427,900. This decline is of particular importance in vie wof the fact that the trade during the first half of 1931 was slightly greater than in 1930. Many firms are operating their plants only two or three days a week, while some have closed entirely. Keen domestic competition, low prices and small orders tend to make production control difficult since strained finances will not permit the carrying of surplus production in stock. The expiration of the term of the wire rope syndicate is reported to have brought about especially keen competition in that line. Little headway has been made toward the forming of a price syndicate for square netting. The International Wire Export Corporation, of which Germany is a member, is experiencing sharp competition from nonmember countries (United Kingdom and United States).

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THE German export total of 123,465 tons noted above is made up as follows: Wire, hot rolled, or forged, not worked, 14,472 tons, wire, cold rolled or drawn not worked, 35,327 tons wire, cold rolled or drawn, worked, 42,861 tons barbed wire, 17,150 tons wire rope and wire strand, 4,344 tons; and wire fencing, netting and screening, 9,311 tons.

✦ ✦ ✦

German Wire Competition

A recent comment in the "American Metal Market" stated: "Local steel wholesale houses are among those hit as hard as any along the Atlantic seaboard by the imports of foreign steel. Competition on wire products particularly on nails, barbed and galvanized wire and poultry wire fencing from abroad particularly from Germany has been almost impossible to meet from a price standpoint. Against prices of $2.80 to $2.90 per keg out of warehouse, German nails in lots of almost any size desired have been offered as low as $2.40, and although sellers of domestic product point to frequent quality deficiencies in the imported stock they continue to exercise a very depressing influ-

ence and strengthen measurably the call for added tariff protection. One of the largest importers of wire nails and wire products has been a leading mail order house whose offerings to the jobbing trade constitute one of the severest competitive handicaps for wire fabricators. Based on carload quantities of nails the lowest domestic price obtainable here is $2.40 delivered Boston rate of freight points and as pointed out, buyers can obtain the German product in small lots to suit their hand-to-mouth requirements as low as this."

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Disappointing Turnover In German Chains

MOST of the turnover in industrial and trade chains in Germany is done by the Trade Chain Cartel whose headquarters are at Hagen. In 1931 this Cartel had a turnover amounting to approximately 700,000 Reichsmarks of which 600,000 Reichsmarks represented electrically welded chains and 100,000 Reichsmarks hand-forged chains. In the first half of 1932, however, the turnover did not quite reach 300,000 Reichsmarks and, inasmuch as the season for chains is declining, it will probably continue to decrease during the second half of the year.

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ABOUT 15 firms are members of this chain cartel, while practically the same number are outside it. Although the turnover of these independent firms is not unimportant it is almost solely of local importance.

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German Wire Exports Increasing

THE general improvement of the steel export markets has already influenced the prices for wire rods, which are now decidedly firmer. The continental wire rod cartel has as yet not increased the prices for wire rods, officially, but the rebates granted during the past month have all been cancelled. There is no outside competition at the moment and business has actually been done in (gold) 5.7.6. f.o.b.

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One Strand Barbed Wire

THE one strand barbed wire, on which only the points made of a second strand are pressed on the wire, has not succeeded in capturing the Overseas markets, in spite of the fact that the price is low, but it is a good seller in Europe, and is slowly superceding the two strand barbed wire. The one strand barbed wire is not included in the IWECO control, and the prices for the BWG thirteen wire of lls. (gold) is high. The price on one strand barbed wire while higher than for two strand has a length of nearly 70% more for the same weight.

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New German Routing on Shipments To America

WHEN the shipping season opens next year, barbed wire will be shipped directly to Port Churchill (Hudson Bay) and from there by rail to Western Canada and North West America. Continental wire will be competitive by this new route, especially as the freight rates are very low. Contracts for May, 1933, delivery, have already been placed.

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Europe Specializing In Wire Mesh and Netting for Export

THE German, Dutch and Austrian wire mesh manufacturers are specializing in production for export purposes. Manufacturers who have formerly made all sorts of wire mesh such as mosquito, mining, industrial mesh, etc., are now specialising and producing only special products. Some are making coarse mesh, others fine mesh, etc. The competition is very keen, but an agreement has been made between the Dutch and German wire mesh manufacturers to keep a certain minimum price for the various markets, amongst which are the United States, Canada and the African Colonies.

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THE German cartel of square wire netting manufacturers and the cartel of hexagonal wire netting manufacturers have agreed to combine in advertising and marketing methods for export.

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German Rod Coil Exports Increasing

THE German wire rod cartel reports that the demand for heavy wire rod coils is constantly increasing, in Germany and for export. Approximately 60% of the whole consumption in Germany is now for coils exceeding 100 kg in weight and approximately ⅓ of the total quantity for coils of more than 150 kg. Japan and England are the chief buyers of these heavy coils.

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IWECO Prices Maintained

THE IWECO has been able to maintain the increased prices, except for wire nails. In this product there is keen competition from small outsiders and for various markets the cartel was forced to reduce prices to the extent of £ 5.5. (gold) basis. The cartel is now receiving competition from a new outside source, namely, S. A. Laminois et Trefileries, Franco-Belged'Anvers. This company is increasing its production by installing new wire nail and wire drawing machinery and had forced the IWECO to reduce prices for Belgian domestic consumption. On the export market this company has only sold small quantities, but is expected to start competition very soon in selling larger

(*Please turn to page 442*)

A Review of Recent Wire Patents

No. 1,880,219, PIN OR NEEDLES, Patented October 4, 1932 by Edith Sparke of Berkeley, California.

One of the purposes of the invention is to provide a combination pin and needle that may be quite easily inserted into and withdrawn from a garment, cloth or other material and at the same time because of the several offset shanks joined by obliquely extending portions forming shoulders, the device will hold against accidental displacement.

✦ ✦ ✦

No. 1,880,474, WIRE FABRIC, Patented October 4, 1932 by Clarence E. Fink of Cambridge, Maryland.

The invention relates to conveyor belts constructed from spirally woven metallic fabric and the inventor provides rods of wire, forming hinges between the coils making up the fabric, so that when the coils adjust themselves to the curvature of the pulleys or drums over which they run, they will not exert a screw action upon the proceeding coil and the belt will then travel in a straight course without lateral creeping.

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No. 1,880,475, WIRE FABRIC, Patented October 4, 1932 by Edward F. Pink of Cambridge, Maryland.

In this wire fabric for use in conveyor belts, the inventor provides a reinforced selvage edge to protect the edge of the wire fabric, this selvage being provided by a chain placed at each side edge of the belt. The ends of the wires forming the fabric are placed between the limbs of the links with their extremities flush with the outer edges of the links and soldered or otherwise secured thereto.

✦ ✦ ✦

No. 1,880,628, MEANS FOR HEADING NAILS AND TACKS, Patented October 4, 1932 by Harry W. Wilson of Stoughton, Mass.

The inventor tends to obviate the jambing and plugging of the bore of the heading die in nail and tack making machinery as well as the breaking and splitting of the heading die and heading pin.

✦ ✦ ✦

No. 1,880,764, SUBMARINE SIGNALING CABLE, Patented October 4, 1932 by Oliver E. Buckley of Maplewood, New Jersey, assignor to Bell Telephone Laboratories, Incorporated of New York, N. Y., a Corporation of New York.

The object of the invention is to provide shielding for both high and low frequency electrical disturbances of the terminal portions of particularly long deep sea submarine telephone cables of the concentric return type, the assembly including a continuously loaded central conductor of wire and a concentric return conductor continuously surrounded by magnetic material, wherein the return conductor or at least a part of it, in cases where the return conductor is partly formed by the metallic armoring of the cable, is insulated to shield the insulated part of the return conductor from low frequency electrical disturbances.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

No. 1,881,018, COILING APPARATUS, Patented October 4, 1932 by Malcolm C. Cary of Baltimore, Maryland, assignor to Western Electric Company, Incorporated of New York, N. Y., a corporation of New York.

This apparatus is particularly adapted for coiling wire and includes a centrally pivoted arm having a coiling spool mounted at each end and rotating thereone, a clutch portion being connected to each spool. The arm is freely rotatable to bring one of the spools to a loading station where the arm is locked in position and the clutch portion engaged to drive the spool by a foot treadle-operated system of gears and levers, the spool on the other end being free to permit the coil to be tied, tagged and removed. It appears that the apparatus is intended for coiling rubber covered wire, altho it may be used for coiling uncovered wires as well.

✦ ✦ ✦

No. 1,881,019, WINDING APPARATUS, Patented October 4, 1932 by Robert Ernest McFarland of La Grange, Illinois, assignor to Western Electric Company, Incorporated of New York, N. Y., a Corporation of New York.

The apparatus is particularly adapted for coiling strands for shipment. The coiling heads of the apparatus are mounted on a horizontal support which is positioned to rotate upon a vertical pedestal having a drying shaft mounted thereon with a bevel gear at the one end which is eccentrically positioned with respect to the axis of rotation of the horizontal support. Two bevel gears are attached individually to horizontal shafts supported by the horizontal support for actuating the coiling head, so that, when the gear of one coiling head, so that, when the gear of one coiling head shaft is in engagement with the bevel gear of the driving shaft, the corresponding gear of the other coiling head shaft is disengaged and not operated thereby. In this manner it is possible to actuate either of the coiling heads selectively by rotating the horizontal support to a predetermined position.

✦ ✦ ✦

No. 1,881,278, SOLDER WIRE EXTRUSION PRESS, Patented October 4, 1932 by Conrad C. Jacobson of Glen Ridge, New Jersey, and James Schweder of Brooklyn, New York, assignors to John Robertson Co., Inc., of Brooklyn, New York, a Corporation of New York.

More particularly, this invention relates to a hydraulicly operated press for producing cored solder wire. Among the objects of the invention is to provide a press in which the movement of the ram for extrusion purposes, is automatically reversed at the end of the extrusion stroke, one in which valves automatically open a hydraulic circuit to by-pass the liquid from the pump when the ram is in its rearmost position and one in which the return stroke of the ram is performed more quickly than the extrusion stroke.

✦ ✦ ✦

No. 1,881,341, ARMATURE, Patented October 4, 1932 by Vincent G. Apple and Frederick W. Cotterman of Dayton, Ohio, assignors to Vincent G. Apple Laboratories of Dayton, Ohio.

In this armature the core, the turns of wire composing the winding, and the bars composing the commutator are all embedded in the same substantially continuous mass of insulating material and are thus permanently held in spaced relation and protected against the effect which results when oil, moisture or foreign matter is permitted to enter into the spaces between the conductive portions of the structure.

✦ ✦ ✦

No. 1,881,480, CONTINUOUSLY LOADED COMMUNICATION CONDUCTOR, Patented October 11, 1932 by John J. Gilbert of Douglaston, New York, assignor to Bell Telephone Laboratories, Incorporated, of New York, N. Y., a Corporation of New York.

An object of the invention is to reduce the eddy-current losses in the loading material in long cables for high frequency telegraphy or for telephone communication. A magnetic material surrounds the conductor and is comprised of a layer of helical turns of tape with not less than about fifty per cent overlap of adjacent turns.

✦ ✦ ✦

No. 1,881,499, SUBMARINE CABLE LOADING COIL, Patented October 11, 1932 by William S. Gorton of Maplewood, New Jersey, assignor to Bell Telephone Laboratories, Incorporated of New York, N. Y., a Corporation of New York.

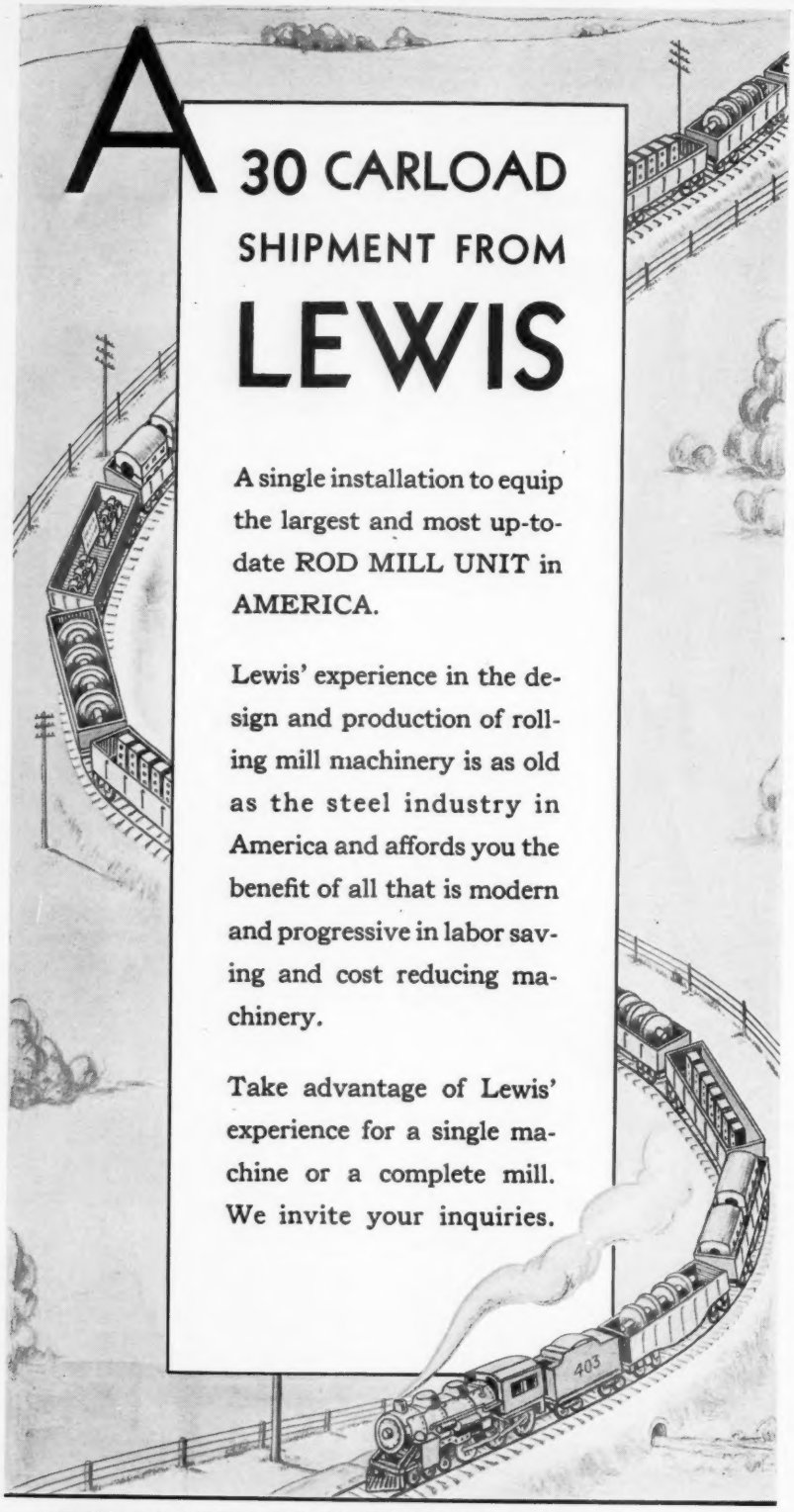
In accordance with this invention, the material used in the loading coil, preferably in the form of fine wires or tapes, is given a helical lay or twist in the manner of the lay used in the manufacture of ordinary jute ropes. It is claimed that by this arrangement the effect of stresses upon the desired properties of the wire material forming the cable, during and after the laying of the cable, are reduced.

✦ ✦ ✦

No. 1,881,672, METHOD OF MAKING SPRING STRUCTURES, Patented October 11, 1932 by Carl Kirchner of Carthage, Missouri, assignor to Leggett and Platt Spring Bed and Manufacturing Company of Carthage, Missouri, a Corporation of Missouri.

One of the objects of the invention is the provision of new means for connecting two coils of two-coil springs with a helical in a manner such that the coils will be held firmly to each other and to the helical, so as to reduce looseness and squeaking in the assembled structure. The method employed consists in crossing and expanding two portions respectively of two coils of two springs

(Please turn to page 438)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The Manufacture of Bolts and Nuts

(*Continued from page 420*)

box and heated with a gas burner underneath, is used for drawing.

✦ ✦ ✦

IN the heat treatment of product a long gas furnace, of brick construction steel encased, is employed. This unit is 22 ft. long, 4 ft. high and 4 ft. wide and is fired with 8 gas burners on one side and 7 on the other. It is equipped with a wire mesh traveling conveyor of alloy steel which projects beyond the charging end some 8 ft. to form a loading table. This conveyor is suspended between pulleys and is driven by a 5 horsepower motor through speed reduction gears. The parts pass through the furnace and are dumped from the discharge end of the belt, through a hole in the hearth of the furnace directly into either an oil or water quench tank.

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THIS unit is divided into two zones, preheat and heating, and each has an automatic temperature control with a recording pyrometer. The furnace control operates up to a temperature of 1650 deg. F. Below the discharge end and projecting under, just enough to receive the work from the chute, are two steel quench tanks, each 8 ft long and 4 ft. wide. One is for oil and the other for water and both are on trucks so that either can be quickly rolled sideways into place to receive the work. Both are equipped with traveling conveyors which move the work through the quenching medium and out. The product is dumped into containers for further handling. Standard bolts are of S. A. E. 1020 steel and the time they are in the furnace depends on diameter, characteristics desired, etc.

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SINCE gas is turned in these furnaces the mixture can be adjusted to obtain atmospheric control. This reduces the amount of scaling and produces a product of better fit on the threads and better appearance.

✦ ✦ ✦

IN addition to the hot work divisions and heat treating depart-

ment, there are the cold work sections including cold upsetting, pointing, roll or cut threading, tapping, trimming, drilling, inspection, sorting, packing, etc. These are completely equipped with the latest automatic and semi-automatic machines. There is a complete, modern machine shop for making dies, tools, jigs, etc., and the company has its own power plant. A physical laboratory is continuously active making tests on all incoming material to see that it is up to specification and checking the quality of the finished product.

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Simplified Practice Recommendation on Woven-Wire Fencing

ALL of the producers of woven-wire fencing who have accepted Simplified Practice Recommendation No. 9-28 have expressed their intention to extend their present methods of identifying the simplified lines by including statements in catalogs and other trade literature, according to an announcement by the division of simplified practice of the Bureau of Standards. For several years past some manufacturers of this commodity have been attaching tags to their rolls of fencing to show that they conform to this recommendation.

✦ ✦ ✦

THE general adoption of the identification plan should assist the woven wire fencing industry in maintaining close adherence to the waste elimination program.

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THE woven-wire fencing recommendation, which was proposed and developed by the industry in 1923, and subsequently revived in 1928, has been instrumental in reducing the number of styles of this commodity from 552 to 69, or approximately 89%, and the number of sizes of woven-wire fence packages from 2,072 to 138, or approximately 93%.

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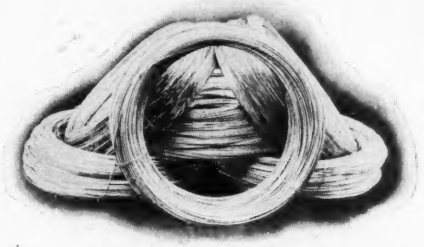

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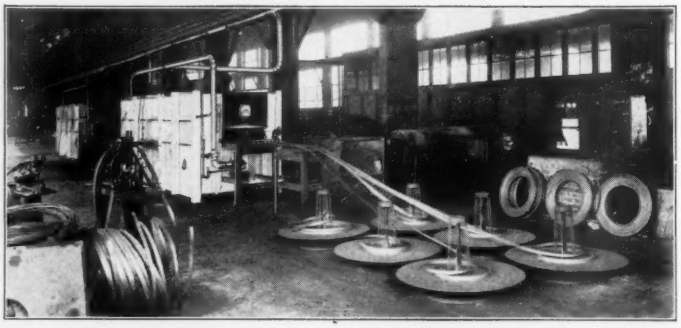

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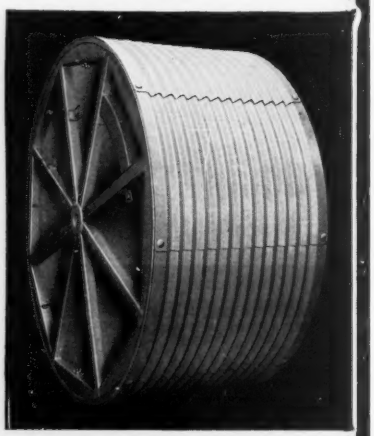

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A Review of Recent Wire Patents

(*Continued from page 435*)

and while holding these portions expanded, screwing into encircling engagement therewith, between their crossing points, a helical, the same coils of which encircle both of said portions and then permitting the portions to contact into binding engagement with the helical.

✦ ✦ ✦

No. 1,882,427, SPRING CONSTRUCTION, Patented October 11, 1932 by Walter Kiwi, of Andalusia, Pennsylvania, assignor to Peerless Springs, Incorporated, of West Chester, Pennsylvania, a Corporation of Pennsylvania.

In this spring construction for cushions and the like, spiral springs are provided, the upper and lower adjacent coils of which overlap longitudinally and laterally, the end of the upper last coil of one spring being twisted both right and left hand in serpentine-fashion, completely around the end of the upper last coil of the companion spring, and the end of the lower last coil being similarly secured with respect to the end of its companion spring by the juncture of the twisted portions, each twisted portion forming a diamond-shaped connection. By this construction extra clips are eliminated.

✦ ✦ ✦

No. 1,882,649, SPRING STRUCTURE, Patented October 11, 1932 by Solomon Karpen and Charles Lofman of Chicago, Illinois, assignors to S. Karpen & Bros., of Chicago, Illinois, a Corporation of West Virginia.

This spring structure relates particularly to mattresses and the like and comprises parallel rows of upholstery springs having their end rings disposed in contact at lines between the rows with the end rings having U-shaped depressions at their adjacent portions. Helical connectors are arranged between the rows below the plane of the end rings and having threaded engagement with the depressions. The depressions bear a staggered relation transversely with respect to the connectors, and the connectors are adapted to tie together two rows of the springs and to hold the members of each row against shifting longitudinally with relation to the connector.

✦ ✦ ✦

No. 1,882,747, REENFORCING FABRIC, Patented October 18, 1932 by Edward L. Benedict of Pittsburgh, Pennsylvania, assignor to Pittsburgh Steel Company of Pittsburgh, Pennsylvania, a Corporation of Pennsylvania.

In this reenforcing fabric for stucco and plaster, it is claimed that the mesh may be composed of relatively small gauge wire, the inventor providing means for so holding the backing sheet and wire mesh that the backing sheet is not likely to slip relative to the mesh and thus result in excessive slack in the sheet at some points relative to certain other points.

✦ ✦ ✦

No. 1,882,902, CABLE FORMING APPARATUS, Patented October 18, 1932 by Lester O. Reichelt of Cranford, New Jersey, assignor to Western Electric Company, Incorporated of New York, N. Y., a Corporation of New York.

This apparatus is particularly adapted for forming and binding a number of individual wire cable units, a rotatable tractor-type capstan is also provided for introducing a twist into the assembly and advancing the assembly to a take-up unit. A core truck onto which is wound the completed cable is rotatably mounted in the take-up unit which has affixed thereupon a floating ring adapted, with a hydraulic device, for controlling the speed of rotation of the core truck and the amount of tension on the cable as it is wound onto the core truck.

✦ ✦ ✦

No. 1,883,130, STRAND HANDLING DEVICE, Patented October 18, 1932 by Ernest R. Trouche of Baltimore, Maryland, assignor to Western Electric Company, Incorporated of New York, N. Y., a Corporation of New York.

Preferably, this apparatus is intended for separating a duplex rubber covered wire conductor into its component twin strands and includes a splitting head having an elongated cylinder in which is transversely mounted a pair of abutting freely rotating rollers. The conductor is passed, axially through the cylinder to the rollers by which it is divided, the respective separated strands passing the pair of rollers on the opposite sides thereof. The strands are then drawn through a braiding head to form a braided cord containing the two strands.

✦ ✦ ✦

No. 1,883,177, MACHINE FOR STITCHING WIRE FABRICS, Patented October 18, 1932 by John P. Weis of Nyack, New York, assignor to Metropoli-

tan Sewing Machine Corporation of Nyack, New York, a Corporation of Delaware.

In the manufacture of fabrics, it is sometimes desirable to place a line of stitching adjacent to the selvage as the fabric feeds through the machine, such as for the purpose of covering or for hemming the edge. One object of the invention is the provision of a machine embodying sewing machines which can be held in contact with and guided by the fabric for the purpose of stitching wire to the fabric. The construction is such that the sewing machines will automatically adjust themselves to variations in the width of the fabric by shifting or rolling to and against the selvage of the fabric and thus always place the stitching at a uniform distance from the selvage along the entire length of the material.

✦ ✦ ✦

No. 1,883,269, ELECTRICAL CONDUCTOR, Patented October 18, 1932 by Edward Henry Yonkers of Wilmette, Illinois, assignor to Western Electric Company, Incorporated of New York, N. Y., a Corporation of New York.

The invention contemplates a telephone cable comprising a number of pairs of wire conducting elements with a strip of thin, flat rigid insulating material positioned therebtween with a thin adherent coating of water-proofing substance on the conductors and strips securing the conductors on the strip.

✦ ✦ ✦

No. 1,883,470, COILED SPRING CUSHION, Patented October 18, 1932 by Dean S. Barnard of Hinsdale, Illinois, assignor to The Rome Company, Inc., a Corporation of New York.

In this bed spring structures, the tie wires may spring up and down relative to their anchoring plates so that the anchoring plates on any spring that must sustain a heavy load may remain horizontal as the spring is compressed and the plates moved down.

✦ ✦ ✦

No. 1,884,230, SPRING STRUCTURE, Patented October 25, 1932 by Clair S. Reed of Jackson, Michigan, assignor to Reynolds Spring Company of Jackson, Michigan.

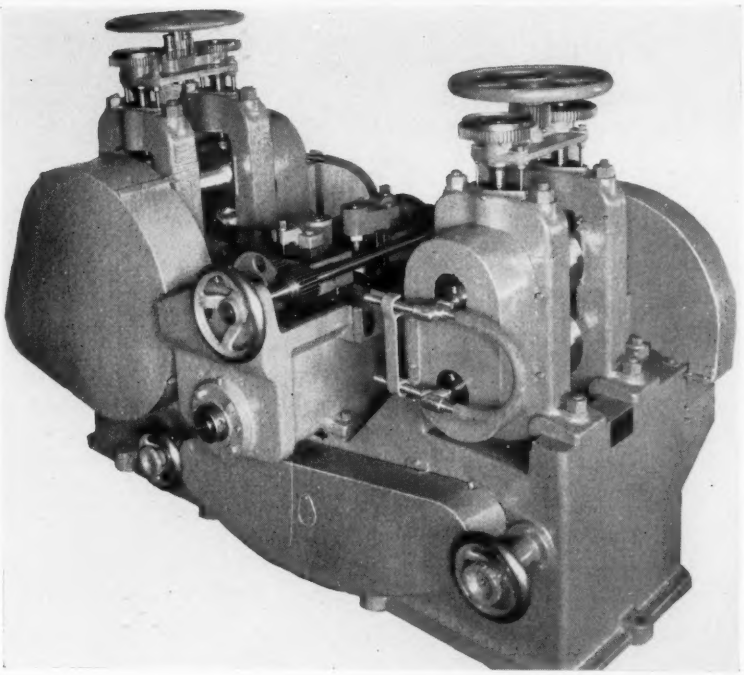
One object of the invention is to provide a stay for spring structures, such as are used in automobile seats, comprising a body having one end bent into such a form as to have an embracing relation with the front of the structure so as to prevent accidental projection of the stay beyond the front of the structure and through the upholstering material in the event that the fastening connection between the stay and the frame at this point should work loose.

✦ ✦ ✦

No. 1,884,270, MATTRESS-SUPPORTING SPRING COVER, Patented October 25, 1932 by William P. Rylander of San Marcos, Texas.

This cover comprises two layers of material with a number of resilient wire spring-supporting members between the layers and spaced apart. It is stated that the device is of particular advantage in connection with inner spring mattresses since the springs are of much smaller diameter than the coils of said spring and the present device provides substantially uniform basic support for all of the inner springs of the mattress.

Flat Wire Rolling Mill



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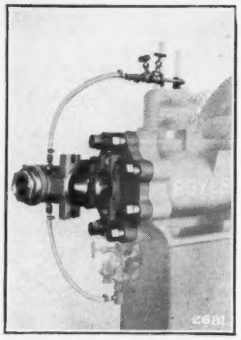
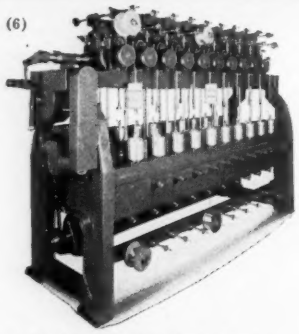


Steam Heated Extruding Head (open) on Royle Tubing Machine



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The Testing of Wire Rope and Rope Wire

(*Continued from page 426*)

wire with quality of rope. Figure 13 shows the life-deterioration relation of two ropes made of wire which originated from the same rods but which have been processed differently. Both A and B wires are acceptable under specifications with relation to tensile strength and torsions. The relatively large difference in endurance values of the two wires is reflected in the increase in rope life of 40 to 50 per cent. The wire tests were run on the same wire which was incorporated in the outer series of wires in the ropes—⅝-in. 6x19 filler wire improved plow preformed hoist ropes.

✦ ✦ ✦

WHEN subject to bending, a wire rope behaves somewhere between a solid bar of the same outside dimensions and a loose assembly of wires, each acting independently. The degree of friction between the various components is constantly changing during the life of the rope, and, with this variation, the stresses imposed on the wires. In an ordinary rope, the wires in the strand and the strands in the rope are simply sprung into position and held in place by a wrapping at the ends. Both wires and strands are under a continual stress. This may be best seen by cutting a seizing. In preformed rope the components are formed to the shape of the helix they will assume in the finished rope. There is therefore a minimum of internal stress and the strands stay in position relative to the core when the seizing is cut.

✦ ✦ ✦

A STRESS analysis which does not take changing conditions and the presence or absence of internal stress into account fails of accurate prediction. Diligent testing and design, accurate manufacture and intelligent application and use in the field are the answer to economic rope life.

Please Send in Your Data for the 1933 Edition
Wire Buyers Guide and Year Book of the Wire Association

C. F. Blackmer to Head American Steel and Wire Co.

THE Finance Committee of the United States Steel Corporation has recommended that **Chas. F. Blackmer,** vice president of the American Steel & Wire Company, be elected to succeed Mr. Keefe as president of that company. Mr. Blackmer has been connected with the American Steel & Wire Company since 1899. He started as laboratory assistant in the Waukegan plant and rose to the superintendency of the Minnesota Steel Company in Duluth in 1921. He was then transferred to Pittsburgh and became district manager for the American Steel and Wire Co. He has come up through the operating department, occupying successively the position of manager of various plants, general superintendent of wire mills, and since April 1930, vice president of the company in charge of operations and has been with various units of the steel corporation for thirty-five years.

Mr. Blackmer succeeds President John S. Keefe whose retirement on Jan. 1 under the pension plan of the United States Steel Corporation, of which the wire company is a subsidiary, was announced recently.

Mr. Keefe has been with companies now affiliated with the United States Steel Corporation for forty-seven years. The last thirty-three with American Steel and Wire.

✦ ✦ ✦

Wire Covering Braiders

(*Continued from page 417*)

threads. Machines of this type accommodate especially large yarn packages and modifications of this design operate at speeds as high as 800 picks, or stitches, per minute. The type is thus intermediate between the Maypole and high speed braider and combines the simplicity and durability of the former with the increased output of the latter.

✦ ✦ ✦

MANY other worthy designs and developments of braiding machines have been made and the writer regrets that he has not the space in which to describe them in this article.

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WIRE DRAWING SOAPS
Established 25 years.
R. H. MILLER CO., Inc. Homer, N. Y.

VIANNEY
DIAMOND DIES
250 EAST 43rd ST., NEW YORK

'Round the World With the Wire Industry

(*Continued from page 434*)

quantities. In spite of recent further decline of the pound sterling competition from the British industry is negligible on all markets, except wire rope.

✦ ✦ ✦

Plan Wire and Nail Plants In Palestine

THE success of a nail factory established some months ago at Haifa encourages imitation. A new department for the manufacture of nails is planned by the iron works near Tel Aviv. It is said that the machinery has already been ordered from Germany. Second-hand machines for nail preparation have arrived in Haifa; the importer is looking for a buyer, who probably will not be difficult to find. Agents of German machine factories have obtained contracts for barbed wire factories to be established at Tel Aviv and at Haifa.

✦ ✦ ✦

THE Hartley Wire Die Co., Inc., of Waterbury, Connecticut, was recently reorganized and its plant is now located in a leased portion of the Chase Metal Works plant at Waterville, Connecticut.

✦ ✦ ✦

THIS company was originally established at Philadelphia in 1850 by Joseph Hartley and carried on under the name of George Hartley until 1900, at which time the name was changed to The Hartley Wire Die Company, under the management of William M. Hartley, son of the late George Hartley, and President of the present corporation.

✦ ✦ ✦

FOR three generations their efforts were devoted exclusively to wire drawing and the diamond die industry. Discontinued connections as wire drawers, with the forming of The Hartley Wire Die Company, in 1900.

✦ ✦ ✦

THE present business is devoted to the manufacture of tungsten carbide dies and tools and diamond dies and tools.

✦ ✦ ✦

THE present officers of the coration are: President, W. M. Hartley; Treasurer, E. W. Hartley; Secretary, G. B. Hartley.

✦ ✦ ✦

Simplified Practice on Mattresses

THE revision of simplified practice recommendation covering springs and mattresses has been accepted by all interests and is to be effective as of November 1, 1932.

✦ ✦ ✦

HERETOFORE it was recommended that mattresses be made to conform to the bed dimensions. There is now before the industry for approval a proposal to specify definitely the sizes of mattresses as 6′—1″ long by 4′—4″; 3′—10″; 3′—1″ or 2′—10″. Those widths are the same as those already selected for the top widths of the spiral or coil wire springs.

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See Furnaces—Various Headings

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Vaughn Machinery Co., Cuyahoga Falls, O.

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CRANES—Wire Mill
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Vaughn Machinery Co., Cuyahoga Falls, O.

DIES—Composition
Vianney Wire Die Works, New York, N. Y.

DIES—Diamond
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Co., New York.
Driver-Harris Co., Harrison, N. J.
Vianney Wire Die Works, New York.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Corp., New York.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Vianney Wire Die Wks., N. Y.

DIES—Recutting and Repolishing Machine
Vianney Wire Die Works, New York, N. Y.

DIES—Rod and Tube Drawing
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Firth-Sterling Steel Co., McKeesport, Pa.
Master Wire Die Co., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
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FURNACES—Automatic
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Electric Furnace Co., Salem, O.
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FURNACES—Electric
Electric Furnace Co., Salem, O.
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Electric Furnace Co., Salem, O.
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Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Lewis F'dry & Machine Co., Pittsburgh, Pa.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
H. L. Reusch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Rubber Strip Covering
John Royle & Sons, Paterson, N. J.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
John Royle & Sons, Paterson, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'v Co., Phila Pa.
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Machinery Co., Phila.
Fred'k M. Conran, Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening Hollow Wire
Fred'k M. Conran, Newark, N. J.

MACHINERY—Stranding
Fred'k M. Conran, Newark, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thompson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Const. Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Swaging
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Taping
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Thompson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

MACHINERY—Tinsel Rolling Mills
Amer. Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Micro Products Co., Peoria, Ill.
F. B. Shuster Co., New Haven, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Thompson-Gibb Electric Welding Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thompson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

PACKING—Metallic Fibre
Hudson Wire Co., Ossining, N. Y.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.

POTS—Lead Melting
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Encasing
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

REELS AND SPOOLS—All Kinds
R. B. Hayward Co., Chicago, Ill.

REEL AND TENSION STAND—
Sleeper & Hartley Inc., Worcester, Mass.

REEL CRUTCHES
R. B. Hayward Co., Chicago, Ill.
Watson Machine Co., Paterson, N. J.

ROLLING MILLS—See Machinery—Rolling Mill

ROLLS—
Lewis F'dry & Machine Co., Pittsburgh, Pa.

SOAPS—Wire Drawing
R. H. Miller Co., Homer, N. Y.

STEEL PLATE CONSTRUCTION—
National Wrought Iron Annealing Box Co., Washington, Pa.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel Plate
National Wrought Iron Annealing Box Co., Washington, Pa.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS
H. J. Ruesch Machine Co., Newark, N. J.

VULCANIZERS
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS
American Insulating Mach'y Co., Phila., Pa.

WIRE—Enameled For Coils
Winsted Insulated Wire Co., Winsted, Conn.

WIRE—Manufacturers
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Insulated Wire Co., Winsted, Conn.

WIRE—Steel—Also Coppered Steel—Also Glavanized Steel
Keystone Steel & Wire Co., Peoria, Ill.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.

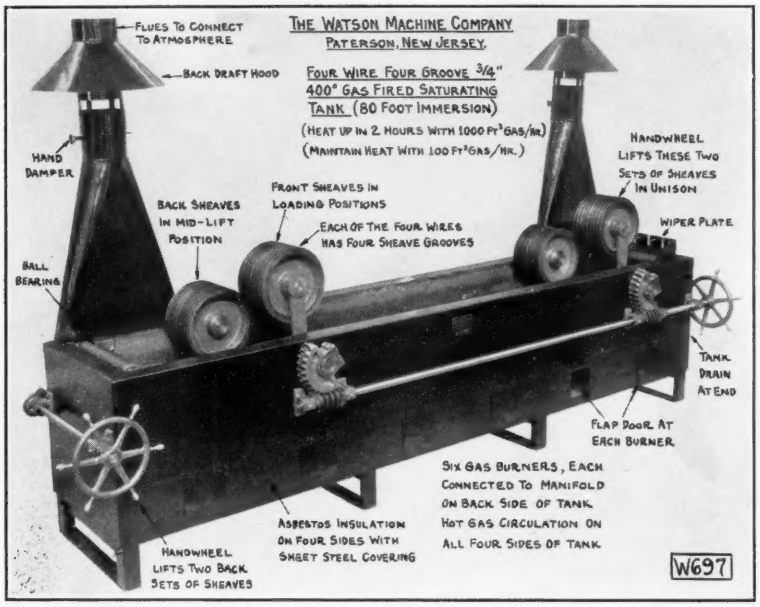
THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

GAS FIRED AND ELECTRICALLY HEATED TANKS

(FOR SATURATING, WAXING AND GREASING OPERATIONS)


THE WATSON MACHINE COMPANY
PATERSON, NEW JERSEY.
FOUR WIRE, FOUR GROOVE 3/4" 400° GAS FIRED SATURATING TANK (80 FOOT IMMERSION)
(HEAT UP IN 2 HOURS WITH 1000 Ft³ GAS/HR.)
(MAINTAIN HEAT WITH 100 Ft³ GAS/HR.)
FLUES TO CONNECT TO ATMOSPHERE
BACK DRAFT HOOD
HAND DAMPER
BACK SHEAVES IN MID-LIFT POSITION
FRONT SHEAVES IN LOADING POSITIONS
EACH OF THE FOUR WIRES HAS FOUR SHEAVE GROOVES
HANDWHEEL LIFTS THESE TWO SETS OF SHEAVES IN UNISON
WIPER PLATE
BALL BEARING
TANK DRAIN AT END
FLAP DOOR AT EACH BURNER
SIX GAS BURNERS, EACH CONNECTED TO MANIFOLD ON BACK SIDE OF TANK. HOT GAS CIRCULATION ON ALL FOUR SIDES OF TANK.
ASBESTOS INSULATION ON FOUR SIDES WITH SHEET STEEL COVERING
HANDWHEEL LIFTS TWO BACK SETS OF SHEAVES
W697

The two tanks shown are representative of our design for LONG and SHORT immersions.

Dimensions can be varied to suit requirements.

Lift mechanism for lifting each sheave set separately, or if desired, a mechanism to lift two sheave sets simultaneously, is supplied.

All walls are Asbestos Insulated with Sheet Metal Protective Covering over insulation.

Ample strength of Sheave Mechanism allows heavy tensions. The W-697 type being suitable for Wire Rope Greasing.

GAS FIRED TANKS

Burner Arrangement allows flexibility of heat control.

Baffle Plates over Burners prevent burning through of Tank Bottom.

Gas Burners and Manifold supplied to Main Feed Connection.

Fire Box fully enclosed with Flap Door at each Burner.

Automatic Heat Control supplied if specified. (at extra cost)

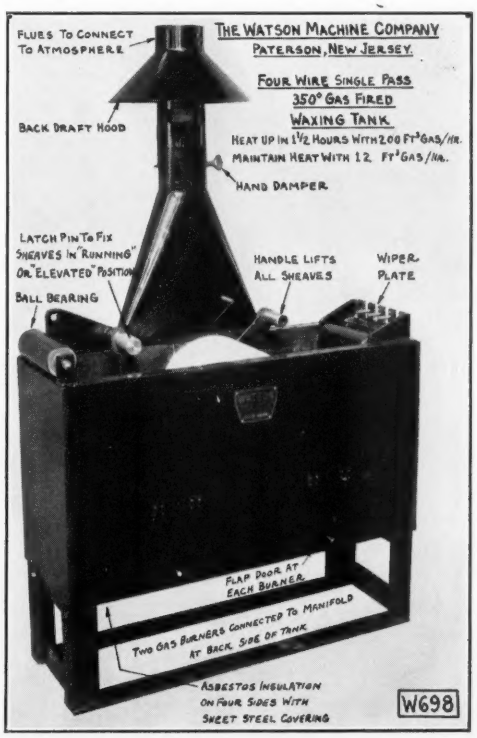
✦ ✦ ✦

ELECTRICALLY HEATED TANKS

Heating Units located to insure even distribution of heat, and to permit quick removal and replacement.

Electrical Equipment, consisting of Heating Units, Thermostatic Temperature Control and Automatic Magnetic Line Switch, all ready for connection to line.

Recording Thermostat supplied if desired, (at extra cost).


THE WATSON MACHINE COMPANY
PATERSON, NEW JERSEY.
FOUR WIRE SINGLE PASS 350° GAS FIRED WAXING TANK.
HEAT UP IN 1½ HOURS WITH 200 Ft³ GAS/HR.
MAINTAIN HEAT WITH 12 Ft³ GAS/HR.
FLUES TO CONNECT TO ATMOSPHERE
BACK DRAFT HOOD
HAND DAMPER
LATCH PIN TO FIX SHEAVES IN "RUNNING" OR "ELEVATED" POSITION
HANDLE LIFTS ALL SHEAVES
WIPER PLATE
BALL BEARING
FLAP DOOR AT EACH BURNER
TWO GAS BURNERS CONNECTED TO MANIFOLD AT BACK SIDE OF TANK
ASBESTOS INSULATION ON FOUR SIDES WITH SHEET STEEL COVERING
W698

CONTROLLED ATMOSPHERE
FURNACES

We have developed an inexpensive atmospheric medium and built controlled atmosphere furnaces for bright and clean annealing . . . . continuous copper brazing . . . . for preventing oxidation and decarburization in heat treating . . . . and luminous flame furnace for heating for rolling and forging with complete absence of scale.

Continuous Brazing Furnaces

● ● **With our continuous copper brazing and silver soldering equipment the assemblies are loaded on a conveyor and carried through the furnace. The parts actually "grow together" and a joint is made which is even stronger than the original parts. On some products it is possible to anneal and braze in one operation.**

Bright Annealing Furnaces

● ● **In annealing operations, the material comes from the furnaces bright, clean and dry. These furnaces are built in sizes to handle any production required; for ferrous and non-ferrous metals in various shapes and forms—sheet, strip, blanks, stampings, wire in coils, strands or on spools; or for tubing in coils or lengths. This equipment is also used for annealing and deoxidizing material before enameling, thus saving the expense of pickling.**

Heat Treating Without Decarburization

● ● **In operations involving hardening, the material is quenched directly from these contiuous furnaces—free from scale and without decarburized surfaces.**

Heating Without Scale

● ● **We have also built some interesting luminous flame furnaces for heating for rolling and forging with complete absence of scale.**

Send for Details

For detailed information on equipment to handle your product, tell us the kind of material you wish to treat, the maximum and minimum sizes to be handled, and the approximate production required per hour or day . . . We will be glad to put samples of your product through this equipment to show you the results you may expect.

THE ELECTRIC FURNACE CO.

FUEL FIRED FURNACES

SALEM, OHIO.

ELECTRIC FURNACES